

# **EXHIBIT 13**

IN THE UNITED STATES DISTRICT COURT  
FOR THE MIDDLE DISTRICT OF TENNESSEE  
NASHVILLE DIVISION

CHAD MEADOW, JOHN AND SUSAN )  
PLISKO AND KENNETH MCLAUGHLIN, ) Case No. 3:15-cv-1124  
INDIVIDUALLY AND ON BEHALF OF )  
ALL OTHERS SIMILARLY SITUATED, )  
PLAINTIFFS, )  
v )  
NIBCO, INC., )  
DEFENDANT. )  
-----

UNITED STATES DISTRICT COURT  
DISTRICT OF NEW JERSEY

KIMBERLY COLE, ALAN COLE, JAMES )  
MONICA, LINDA BOYD, MICHAEL ) Case No. 13-cv-07871  
MCMAHON, RAY SMINKEY, JAMES )  
MEDDERS, JUDY MEDDERS, ROBERT )  
PEPERNO, SARAH PEPERNO, AND )  
KELLY MCCOY, ON BEHALF OF )  
THEMSELVES AND ALL OTHERS )  
SIMILARLY SITUATED, )  
PLAINTIFFS, )  
v )  
NIBCO, INC., )  
DEFENDANT. )  
-----

DEPOSITION OF CYNTHIA SMITH  
VOLUME I  
(TAKEN by DEFENDANT)  
CHARLOTTE, NORTH CAROLINA  
MAY 24, 2017

REPORTED BY: Meredith R. Schramek  
Registered Professional Reporter  
Notary Public

1           Deposition of Cynthia Smith, taken by the  
2   defendant at Robinson Bradshaw & Hinson, P.A.,  
3   101 North Tryon Street, Charlotte, North Carolina, on  
4   the 24th day of May, 2017, at 9:06 a.m., before  
5   Meredith R. Schramek, RPR, Notary Public.

6

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C O N T E N T S

8   The Witness:           CYNTHIA SMITH

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1

P R O C E E D I N G S

2

CYNTHIA SMITH,

3

having been duly sworn,

4

was examined and testified as follows:

5

EXAMINATION BY COUNSEL FOR DEFENDANT

6

BY MR. KUHLMAN:

7

Q Please go ahead and introduce yourself for

8

the record.

9

**A Cynthia Leann Smith.**

10

Q And, Ms. Smith, do you go by Cynthia or

11

Cindy?

12

**A Either is fine.**

13

**(Exhibit 1 Marked for Identification.)**

14

BY MR. KUHLMAN:

15

Q Super. My name is Kevin Kuhlman and I

16

represent NIBCO in this case. I'm going to hand you a

17

document that we've already marked as Exhibit 1.

18

Please take a quick look at that.

19

Have you seen this before?

20

**A Yes.**

21

Q Okay. And this is a notice for your

22

deposition today; is that right?

23

**A Yes.**

24

Q And did you bring any documents with you

25

today to your deposition?

1           **A     I did not.**

2           Q     Okay. Did you do anything specific to  
3 prepare for your deposition today?

4           **A     I reviewed the reports that I have written in**  
5 **relation to this case.**

6           Q     And when you say "reports," are you referring  
7 to just the written reports or also the appendices?

8           **A     The reports and some of the appendices. I**  
9 **did not review all of them.**

10          Q     Okay. Which appendices did you review?

11          **A     I do not recall specifically.**

12          Q     Okay. And aside from the reports and some of  
13 the appendices, did you review any additional documents  
14 to prepare for today?

15          **A     Not specifically. I have recently reviewed**  
16 **portions of some of the ESI reports but I did not**  
17 **review them end to end as a deliberate effort to**  
18 **prepare for today.**

19          Q     Okay. Do you recall which sections of the  
20 ESI reports you looked at --

21          **A     Not specifically. I would have reviewed them**  
22 **in preparing the supplemental report.**

23          Q     Okay. Before we get too much further, I'll  
24 run through a couple ground rules. I know you've been  
25 deposed before, but we'll just run through them really

1 quickly.

2 You understand you're under oath today;  
3 right?

4 **A I do.**

5 Q And you'll be telling the truth; correct?

6 **A Always.**

7 Q And you tell the truth in all your  
8 depositions I'm sure.

9 **A I do.**

10 Q And do you understand that, if you need to  
11 take a break, just let us know and we'll take a break?

12 **A I will.**

13 Q And if you don't understand a question, I  
14 would ask that you ask me to rephrase it. I will try  
15 to do better. Is that fair?

16 **A I will.**

17 Q All right. And if you answer a question, I'm  
18 going to assume you understood it. Is that fair?

19 **A Yes.**

20 Q All right. And for the purpose of today's  
21 deposition, we're going to be talking about the Meadow  
22 case. Are you familiar with the Meadow case?

23 **A I am.**

24 Q And are you familiar with who the plaintiffs  
25 are in the Meadow case?



1           **A     I am.**

2           Q     And who are the plaintiffs in the Meadow  
3 case?

4           **A     The named plaintiffs are Chad Meadow, John**  
5 **and Susan Plisko, and Kenneth McLaughlin.**

6           Q     And are there only three different homes at  
7 issue with the named plaintiffs in this case?

8           MR. EDWARDS: Object to the form.

9           THE WITNESS: My understanding is that there  
10 are three named plaintiffs but that the case also  
11 involves other similarly situated homeowners who are  
12 not named.

13 BY MR. KUHLMAN:

14          Q     But with respect to the named plaintiffs,  
15 there are three separate houses. Is that fair?

16          **A     There are three houses that I evaluated. I**  
17 **don't know if those are the only three houses that they**  
18 **own or that may have this plumbing.**

19          Q     Okay. When did you first learn about the  
20 Meadow case?

21          MR. EDWARDS: Object to the form.

22          THE WITNESS: I don't recall with certainty.  
23 I believe my first -- I believe my first contact with  
24 any of the attorneys associated in that case may have  
25 been spring of last year but I don't recall

1 specifically when.

2 BY MR. KUHLMAN:

3 Q Do you remember who contacted you for this  
4 case?

5 A I spoke with Larry Deutsche.

6 Q Do you remember what you two talked about?

7 A Not specifically, no.

8 Q Did he tell you anything about the case?

9 MR. EDWARDS: I'm just going to interpose an  
10 objection there just to make sure you don't get into  
11 the content of the conversation. You can answer yes or  
12 no. But I'm going to instruct you not to answer about  
13 any communications between you and your attorneys.

14 THE WITNESS: I don't recall specifically the  
15 content of the conversation or what he may have said.

16 BY MR. KUHLMAN:

17 Q Did he provide you with any facts or data  
18 that you relied upon in forming your opinions?

19 A No.

20 Q Generally speaking, with respect to the  
21 attorneys that you've talked to with respect to the  
22 Meadow case, have any of them provided you with any  
23 facts or data that you relied on in forming your  
24 opinions?

25 A No. Not that I recall, no.

1                   **(Exhibit 2 Marked for Identification.)**

2                   MR. KUHLMAN: All right. I'm going to go  
3 ahead and hand you a document that we've marked as  
4 Exhibit 2. And this is the report. So I don't have an  
5 extra copy for you.

6                   MR. EDWARDS: That's fine. Thanks.

7                   **(Exhibit 3 Marked for Identification.)**

8 BY MR. KUHLMAN:

9                   Q Will you please take a moment and look  
10 through that document. And while we're at it, I'm just  
11 going to hand you a document that we've marked as  
12 Exhibit 3 for this case. We'll have you flip through  
13 that one next. And I'm not trying to trick you here.  
14 I just want to make sure that to the best of your  
15 knowledge looking at this right now it appears to be a  
16 complete copy of your expert report minus some of the  
17 appendices.

18                  A Thank you for clarifying. It does not appear  
19 to be a complete copy. It's missing all but, it  
20 appears, the first three appendices for the original  
21 report.

22                  Q It is?

23                  A I only see the first three appendices.

24                  Q You see the first three appendices, but it  
25 doesn't have the materials that were provided in

1 electronic format?

2 A That appears to be the case. It appears to  
3 only include my CV, my fee schedule and my history of  
4 expert testimony. None of the technical appendices are  
5 provided.

6 Q Right. And those were documents that were  
7 produced in electronic format through an FTP site; is  
8 that right?

9 A Well, even the report was produced in  
10 electronic format via FTP site. I believe that some of  
11 these appendices were included within the report and  
12 others were produced separately at the FTP site in  
13 separate folders.

14 Q And what is Exhibit 3?

15 A Exhibit 3 is my first supplemental report in  
16 this case, again, minus the appendices. It also  
17 appears to have some appendices but not all.

18 Q And I'll represent to you that this is the  
19 format that we received these documents that were  
20 marked as the report. So that's the way we produced  
21 them. I understand there are additional files for the  
22 appendices.

23 A They were produced in their entirety as a  
24 complete set on the FTP site. The appendices were  
25 produced with the report on the FTP site. They are not

1       produced here. So I would have to disagree with you  
2       that they are being produced in the format in which you  
3       received them. You did receive them with the  
4       appendices.

5           Q     All right. Aside from the appendices, do  
6       these appear to be complete copies of the actual  
7       written report that you prepared?

8           A     To the extent that I can tell just by  
9       thumbing through them, yes.

10          Q     All right. Let's take a look here at your CV  
11       here at the back. I believe it's marked as Appendix 1  
12       and it starts on page 74 of this report.

13          A     I'm sorry. Which report are you looking at?

14          Q     Exhibit 2, your report.

15          A     And page 71, you said?

16          Q     I believe it's 74.

17          A     74?

18          Q     Yeah. Appendix 1, your CV.

19          A     Okay.

20          Q     Is this your current CV?

21          A     It is.

22          Q     Has anything changed since this document was  
23       produced to us?

24          A     No.

25          Q     Would you like to add anything to this CV?

1           **A     No.**

2           Q     All right. With respect to publications, the  
3 CV indicates that you have not authored any  
4 publications during the last 10 years. Have you  
5 authored any peer-reviewed research papers during your  
6 career at all?

7           **A     Define what you mean by "peer-reviewed**  
8 **research paper."**

9           Q     A research paper that would have gone out  
10 generally to the academic community.

11          **A     There are a number of things that I published**  
12 **that I would consider to be peer reviewed. In fact,**  
13 **every expert report I write is arguably peer reviewed.**  
14 **Certainly they're being reviewed by others in the**  
15 **technical community who would be critiquing them quite**  
16 **harshly in some cases or in an effort to be harsh.**

17               **I have also prepared, for example, technical**  
18 **reports related to failure analysis that have been**  
19 **submitted to technical paper competitions and have been**  
20 **awarded awards through those competitions. I do not**  
21 **publish things for technical groups or for books and**  
22 **that type of thing as a general rule. That's not the**  
23 **focus of my business.**

24          Q     Okay. And the technical reports that you  
25 mentioned that you submitted for publication or for an

1       award, did any of those deal with PEX products at all?

2               **A     Not to my knowledge.**

3               Q     And with respect to the expert reports that  
4       you referenced, are those generally made available to  
5       the public or are those usually only provided to the  
6       attorneys and experts involved in a specific case?

7               **A     I would not distribute them to the public.**  
8       **What other people do with them, I do not have any**  
9       **visibility to or control. I know that at least in one**  
10       **case, one of my affidavits or reports was published to**  
11       **the Internet and made publicly available by an attorney**  
12       **involved in the case.**

13              Q     And which case was that?

14              **A     That was a case involving Unique Industrial**  
15       **Products and Uponor.**

16              Q     And you said there was an affidavit that you  
17       prepared that was published on the Internet?

18              **A     Yes.**

19              Q     And what did that affidavit discuss?

20              **A     It discussed litigation that Unique and**  
21       **Uponor were engaged in.**

22              Q     Could you describe the type of litigation?

23              **A     It involved brass pipe fittings and threaded**  
24       **plastic nuts as I recall that were used in plumbing**  
25       **systems or heating systems.**

1           Q     And on what topics were you opining in that  
2     affidavit?

3           **A     I don't understand your question.**

4           Q     Did you discuss brass plumbing products in  
5     that affidavit?

6           **A     Yes.**

7           Q     What about the -- what was the other product  
8     that you mentioned?

9           **A     They were threaded plastic nuts.**

10          Q     All right. Were you expressing some sort of  
11     expert opinion in this affidavit?

12          **A     I was expressing technical opinions. I don't**  
13     **recall at this point if I was serving as a fact witness**  
14     **or an expert witness in that case. I would have to go**  
15     **back and look. I believe it was as an expert.**

16          Q     Okay. And were these brass plumbing  
17     fixtures?

18          **A     They were brass plumbing fittings. They are**  
19     **ASTM F1807 style brass insert fittings.**

20                 MR. EDWARDS: When you read off a long number  
21     like that, do it slower for our court reporter.

22     BY MR. KUHLMAN:

23          Q     All right. So let's just talk very briefly  
24     about F1807 while we're at it. What is F1807?

25          **A     That is an ASTM standard that governs brass**



1       insert fittings that are used with PEX plumbing  
2       systems.

3           Q     Okay. And what is an ASTM standard?

4           A     It's an industry standard that offers  
5       guidelines regarding certain aspects of testing or  
6       materials related to different products.

7           Q     And how are these ASTM standards prepared?  
8       Who authors them?

9           A     They're authored by different people and  
10      groups of people with a specific interest or specific  
11      knowledge related to that topic. It's a variety of  
12      people.

13          Q     Would there be a committee of some sort that  
14      would author these ASTM standards?

15          A     There is a committee that oversees the charge  
16      for authoring them with input from other people who are  
17      ASTM members. There is a specific committee that's  
18      tasked with the effort of managing the process of  
19      authoring these. They don't necessarily in a vacuum  
20      author them by themselves.

21          Q     And do you know what the name of the  
22      committee is that would have responsibility over F1807?

23          A     Not off the top of my head. I would have  
24      to --

25          Q     Are you on that committee?

1           **A     I am on the F17 pipe committee.**

2           Q     And what is the F17 pipe committee?

3           **A     It's a committee that governs polymer pipe**  
4           **standards for ASTM.**

5           Q     And specifically, which standards are you  
6           referring to that are governed by F17?

7           **A     The standards that would begin with F17.**

8           Q     And are any of those standards relevant to  
9           this case?

10           MR. EDWARDS: Object to the form.

11           THE WITNESS: I'm sorry. I was distracted by  
12           the -- could you please --

13           BY MR. KUHLMAN:

14           Q     Did you rely on any of the standards that  
15           would be overseen by the F17 pipe committee in reaching  
16           your opinions in this case?

17           **A     Quite likely. I would need to go back and**  
18           **look. I would have to go back and look and see which**  
19           **standards fall under different committee. Standards**  
20           **sometimes get moved around from one committee to**  
21           **another. And I would have to look at timing and so**  
22           **forth. Certainly there would be standards that would**  
23           **be applicable to PEX pipe that would fall under that**  
24           **committee's charter.**

25           Q     So, for example, F876, would that fall under

1 the charter of the F17 pipe committee?

2 A Yes. I believe that it has and does.

3 Q Okay. So it doesn't start with F17. It  
4 starts with F876?

5 A That is correct. I believe I misspoke a  
6 moment ago regarding what standards. The committee is  
7 the F17 committee governing pipe. And I would have to  
8 look and see what all falls under that specifically.  
9 My involvement in that committee is I receive e-mail  
10 notifications from them, as I did this morning, saying  
11 "There's a new standard that we need you to review and  
12 comment on if you feel inclined to comment on that."  
13 So I don't have visibility to anything that would show  
14 a full listing of ASTM standards that are dedicated at  
15 the moment to that committee. Or if I do, that is not  
16 something that I have specifically gone to look for.  
17 So that's not a question I feel like I can answer as we  
18 sit here.

19 Q Okay. So to the best of your recollection  
20 have you voted on making any changes to F876 from 2006  
21 to the present?

22 A I don't recall. I have voted on some  
23 standards and not others dependent upon my work level  
24 at the time a standard rolls out. I don't review all  
25 the standards that come my way. I review some of them

1       in great detail. I have made comments on certain  
2       standards. I have made suggestions for changes to  
3       certain standards. I don't recall which standards as  
4       we sit here today.

5           Q     Have you made any comments with respect to  
6       F2023?

7           A     I don't recall what standards I have  
8       commented on.

9           Q     Do you recall which standards you believe  
10      needed revision over the years?

11          A     I don't recall which standards I believed  
12      needed revision.

13          Q     Sitting here right now, do you take issue  
14      with the F2023 testing and its use with respect to PEX  
15      water piping?

16                MR. EDWARDS: Object to the form.

17                THE WITNESS: I need you to be a little more  
18      specific. I don't understand what you mean when you  
19      say do I take issue with it.

20      BY MR. KUHLMAN:

21          Q     Well, over the years, have you had concerns  
22      about the validity of F2023 test results?

23          A     I do have some concerns.

24          Q     Okay. And is that with respect to the actual  
25      test procedure or something else?

1           A     It's with respect to the empirical experience  
2     with NIBCO pipe not matching what the ASTM standard has  
3     led NIBCO to believe they could expect.

4           Q     Tell me what you mean by that.

5           A     NIBCO has repeatedly asserted that they  
6     believed that their product should last at least  
7     50 years during service based upon a very, very limited  
8     number of samples being subjected to the chlorine  
9     resistance test and demonstrating a predicted  
10    extrapolated life greater than 50 years as a result of  
11    that test. Empirical experience has shown that pipes  
12    that were formulated reportedly identically and  
13    manufactured reportedly identically to the samples that  
14    were subjected to that test have failed in as little as  
15    one to two years in actual field service conditions.  
16    That's a pretty big disconnect.

17          Q     Do you know how many -- you mentioned a  
18    limited number of samples being tested. Do you know  
19    how many samples NIBCO has tested pursuant to F2023  
20    through NSF?

21          A     Not off the top of my head.

22          Q     Do you know how many samples are required to  
23    be tested pursuant to F2023 to receive the independent  
24    listing for a PEX product?

25          A     Not off the top of my head. But if you have

1       a document you'd like me to review, I'd be happy to  
2       review it.

3           Q       We'll get to that here in a little while.  
4       Does 16 sound right for the independent listing?

5           MR. EDWARDS: Object to the form.

6           THE WITNESS: Again, if you have a document  
7       you'd like me to review, I'd be happy to review it.

8       BY MR. KUHLMAN:

9           Q       Okay. So sitting here right now, you're not  
10      able to tell me how many samples are required to be  
11      tested for an entity to obtain an F2023 certification  
12      on a product? Is that fair?

13          A       Sitting here right now, I don't feel  
14      comfortable trying to rely on my memory to give you a  
15      number, no.

16          Q       To the best of your recollection, have you  
17      raised any of your concerns over F2023 and how it has  
18      played out with respect to NIBCO's experience? Have  
19      you raised any of those concerns to anyone at NSF or  
20      ASTM?

21          A       Not yet.

22          Q       Do you plan on doing that?

23          A       I don't know what I plan to do just yet.  
24      Right now I'm focused on this case and trying to learn  
25      what it's telling us.

1           Q     What is the purpose of obtaining a  
2     certification on a plumbing product?

3           MR. EDWARDS:   Object to the form.

4           THE WITNESS:   There can be many purposes.  
5     You need to clarify your question, please.

6     BY MR. KUHLMAN:

7           Q     Well, when NSF tests and certifies a product,  
8     a company can reasonably rely on that -- right? -- to  
9     provide them with some comfort that the product is  
10    meeting the standards set forth by ASTM?

11          MR. EDWARDS:   Object to the form of that  
12    question.   Calls for a legal conclusion.

13          THE WITNESS:   From a technical perspective, I  
14    would disagree with what you just said.

15    BY MR. KUHLMAN:

16          Q     Okay.   Why?

17          A     **Well, could you please restate the question?**  
18    **And we'll delve into that.**

19          Q     Can a company rely on a certification issued  
20    by NSF that a product complies with the standards that  
21    are applicable to that product?

22          MR. EDWARDS:   Same objection.

23          THE WITNESS:   A company can rely on anything  
24    they choose to rely on from a matter of day-to-day  
25    business.   And I'm not rendering a legal conclusion or

1 argument here. However, it would be unwise for a  
2 manufacturer to assume that whatever has happened in  
3 that certification testing is necessarily  
4 representative of what is happening day to day in their  
5 process. Most manufacturing operations exhibit some  
6 level of upset from time to time, for example. And if  
7 they aren't doing ongoing quality assurance testing to  
8 monitor for that, I would think they would certainly be  
9 remiss in assuming that no upset could ever happen in  
10 their manufacturing process because they may have  
11 demonstrated a certain performance in a single test or  
12 even a single set of tests that were performed at some  
13 prior point in time. So speaking from a technical  
14 perspective and not a legal perspective at all, I think  
15 it would be unwise for a manufacturer to make any kind  
16 of assumption like that.

17 BY MR. KUHLMAN:

18 Q And is that uncertainty or the possibility of  
19 disruption in the manufacturing process is that the  
20 reason why NSF or other certifying entities would  
21 conduct periodic audits of a manufacturing policy?

22 A You would need to ask NSF what their reasons  
23 are for conducting audits.

24 Q Okay. Have you ever been involved in -- I  
25 know you worked at Uponor for a number of years.



1 During your time at Uponor, were you involved in  
2 assisting auditors with either IAPMO or NSF?

3 **A No. Our quality assurance department would**  
4 **typically handle that.**

5 Q Did you review any of the audit records that  
6 were produced in this case from NIBCO?

7 **A Quite likely. I don't recall specifically as**  
8 **we sit here, but quite likely if they were produced.**

9 Q And do you have any understanding of what  
10 happens if a certifying entity performs an audit and  
11 that audit is failed by a manufacturer?

12 **A I have some visibility to what may happen to**  
13 **specific organizations but I would need you to be more**  
14 **specific.**

15 Q Okay. So with respect to NIBCO, if an audit  
16 was underway with respect to its PEX products and that  
17 audit was failed, what would happen?

18 **A It would depend on what organization and what**  
19 **audit and what aspect a failure occurred and so forth.**  
20 **There's no one set answer to that question.**

21 Q Okay. But would an entity be able to or be  
22 permitted by a certifying entity to continue  
23 manufacturing its product and marking it with their  
24 label if the manufacturer consistently failed to meet  
25 the requirements at an audit?

1 MR. EDWARDS: Object to the form.

2 THE WITNESS: Again, it would depend on the  
3 organization and what their set rules are. You would  
4 have to be far more specific. If you have something  
5 you would like me to review, I'm happy to review it.

6 (Exhibit 4 Marked for Identification.)

7 BY MR. KUHLMAN:

8 Q We've gotten off course here. So let's try  
9 to circle back around to what we were talking about.  
10 You mentioned that you prepared an affidavit that  
11 discussed F1807, compliant brass fittings. So I'm  
12 going to hand you a document that we will mark as  
13 Exhibit 4. What is Exhibit 4?

14 A This is a copy of ASTM F1807, the 2010  
15 revision.

16 Q Okay. And F1807 is the standard  
17 specification for metal insert fittings utilizing a  
18 copper crimp ring for SDR9 cross-linked polyethylene  
19 tubing; is that right?

20 A And SDR9 polyethylene of raised temperature  
21 (PE-RT) tubing.

22 Q And the tubing at issue in this case, is it  
23 SDR9 cross-linked polyethylene?

24 A It is.

25 Q And the fittings that are addressed in your

1 report, are those fittings that are compliant with  
2 F1807?

3 A They are fittings that were likely  
4 manufactured prior to 2010. So it may not be this  
5 exact revision that would be applicable. But yes, they  
6 were marketed by NIBCO as being compliant with ASTM  
7 F1807.

8 Q Are you aware of any changes of significance  
9 to the alloys that are specified in F1807 during the  
10 time that NIBCO was manufacturing its 1006 tubing  
11 products, fittings?

12 MR. EDWARDS: Object to the form of the  
13 question.

14 THE WITNESS: I would need to review the  
15 redlined version of the standard to make that  
16 determination. If you have those redlined versions  
17 available, I'm happy to review them.

18 BY MR. KUHLMAN:

19 Q Well, sitting here right now, are you aware  
20 of any changes as to what alloys were permissible to be  
21 used in these particular types of copper crimp rings?

22 A I'm not aware as we sit here today of any  
23 changes that have occurred. But I can't guarantee that  
24 they didn't occur without looking at the redlined  
25 versions of the standards.

1           Q     So you just don't know one way or the other  
2           if there were changes to the permissible alloys for  
3           this fitting -- for this standard during the time NIBCO  
4           was manufacturing its 1006 product?

5           A     What I said was I'm not aware of any changes  
6           that have occurred. But to be certain that no changes  
7           occurred, I would want to review the redlined versions  
8           of the standards.

9           Q     Okay. If you could, please turn to the  
10          second page of this document.

11          A     Okay.

12          Q     And if you could, please look down to 5.1.3  
13          for machined brass.

14          A     Yes.

15          Q     And it indicates that "Machined brass  
16          fittings shall be made from materials meeting the  
17          requirements of Specification B 140/B 140M copper alloy  
18          UNS 31400 or Specification B 16/B 16M copper alloy UNS  
19          36000"; is that right?

20          A     That is what it states.

21          Q     Okay. Are you aware of any changes to that  
22          particular part of this standard from 2006 to 2012?

23          A     I'm not.

24          Q     And would this standard have been created as  
25          part of a committee process?

1           A     I'm sorry. If I may back you up. For  
2     completeness, we should enter into the record that that  
3     is not all that that section of the standard states.  
4     It goes on to state that "machine brass alloys UNS  
5     C35330 or Specification B 371/B 371M copper alloy UNS  
6     Number C6930 or Standard EN 12164, copper alloy CW 614N  
7     or CW 602N."

8           Q     Okay. And would this standard have been  
9     prepared as part of a committee process?

10          A     All ASTM standards are prepared through a  
11     committee process.

12          Q     Okay. And so how does that work? Who would  
13     have selected that these particular alloys needed to be  
14     used in making these particular types of fittings?

15          A     I can't speak to who sat on that committee or  
16     who made those decisions. I wasn't part of that.

17          Q     Would that have been a group process with  
18     people making comments like you described? Someone  
19     might send out an e-mail and there would be comments  
20     about it?

21               MR. EDWARDS: Object to the form. Calls for  
22     speculation.

23               THE WITNESS: It does call for speculation.  
24     I can't assume that other committees would operate in a  
25     manner similar to my experiences.

1 BY MR. KUHLMAN:

2 Q You do not sit on the committee that  
3 addressed what alloy should be used in machined brass  
4 fittings. Fair?

5 A I don't recall ever reviewing this standard.  
6 So whether it was ever under any other committee that I  
7 may have sat on, I don't know. But I don't recall  
8 having to review this standard as part of the committee  
9 action.

10 Q Okay. Did you sit on any committee or were  
11 you a member of any committee that dealt with alloys  
12 that are used in PEX fittings to the best of your  
13 knowledge?

14 A Not that I recall.

15 Q Okay. And is it your understanding that  
16 NIBCO utilized the C36000 alloy for its machine  
17 fittings?

18 A It's my understanding that a variety of  
19 alloys may have been used for their fittings.

20 Q Okay. Which ones?

21 A We would have to look at the chemical  
22 analysis results to see what the results showed.

23 Q Okay.

24 A Those are documented in my report and ESI's  
25 report.

1           Q     And did you test any unused fittings to  
2     determine what the alloys were that were being used?

3           A     I don't believe that I tested any unused  
4     fittings.

5           Q     With respect to fittings that were removed  
6     from any of the Meadow plaintiff homes, did you perform  
7     any chemical analysis on those fittings to determine  
8     what alloys were used?

9           A     From which home?

10          Q     The Meadow plaintiff homes.

11          A     As I recall, the Meadow home had been  
12     entirely replumbed, and I don't believe we tested any  
13     fittings from the Meadow residence.

14          Q     What about Plisko?

15          A     We did test fittings from the Plisko  
16     residence. I believe at least one. Again, I would  
17     like to reference my report. I have not tried to  
18     commit to memory what testing was performed for each  
19     home. So if you have specific questions, we need to  
20     refer to the report.

21          Q     Okay. And with -- did you say you believe  
22     you removed a fitting from the Plisko home?

23          A     We did remove a NIBCO brass fitting from the  
24     Plisko home and we did evaluate that fitting. I just  
25     don't recall whether we did chemical analysis

1       **specifically of that brass fitting material.**

2           Q     Is it your opinion that NIBCO was making  
3       fittings that failed to comply with the F1807 standard?

4           A     Some of them may have failed to comply with  
5       the standard. That was not the focus of my  
6       investigation of those fittings. My focus of the  
7       investigation was to determine whether or not there was  
8       an inherent vulnerability to dezincification and stress  
9       corrosion cracking related to the alloy chemistry. And  
10      indeed, those tests showed that there was.

11          Q     Do you have any evidence that some of the  
12      NIBCO fittings failed to comply with F1807, the  
13      standard for the alloy usage?

14          A     We would have to review the chemical analysis  
15      results to make that determination.

16          Q     Okay. And those are contained in the report?

17          A     They are contained in the report. They were  
18      in the appendix. I don't know if you have provided a  
19      copy here today, but I produced those results.

20          Q     Well, let me just ask you this: If -- does  
21      the compliance with F1807 bear on your opinions in any  
22      way with respect to the NIBCO fittings at issue in this  
23      case?

24                   MR. EDWARDS: Object to the form.

25                   THE WITNESS: I need you to be more specific



1 with your question, please.

2 BY MR. KUHLMAN:

3 Q In your opinion, if a fitting complies with  
4 F807 [sic] with respect to alloy usage, can it still be  
5 defective for use in a potable water application?

6 MR. EDWARDS: Object to the form.

7 THE WITNESS: It is my opinion that a fitting  
8 could comply with the standard and still fail due to  
9 dezincification or stress corrosion cracking in a  
10 potable water application. Not all of the alloys  
11 specified will exhibit uniform resistance to  
12 dezincification and stress corrosion cracking.

13 BY MR. KUHLMAN:

14 Q So the fact that NIBCO was using different  
15 alloys in its fitting would suggest that the different  
16 fittings would react differently to potable water?

17 MR. EDWARDS: Object to the form.

18 BY MR. KUHLMAN:

19 Q In your opinion.

20 A Certainly alloy chemistry will affect the  
21 dezincification behavior and stress corrosion cracking  
22 resistance of brass plumbing fittings in contact with  
23 potable water. They are not the only things that can  
24 influence that. But certainly chemistry plays a big  
25 role and is an important factor. And those mechanisms

1       **can be avoided through control of alloy chemistry.**

2           Q     Is it your opinion that a manufacturer is  
3     making an improper material choice if it manufactures  
4     its machine brass fittings with the C36000 alloy? Is  
5     that your opinion?

6           A     **I don't understand your question. Is there a**  
7     **question in that?**

8           Q     If NIBCO was manufacturing its fitting to  
9     comply with this standard, F1807, is it your opinion  
10    that that fitting is still defectively designed because  
11    it is using this alloy that is specified?

12           MR. EDWARDS: Object to the form of the  
13    question.

14           THE WITNESS: If the use of that alloy  
15    renders it vulnerable to premature failure in the  
16    intended service environment and prohibits that fitting  
17    from performing in the manner that the manufacturer  
18    advertised that it would perform, then yes, I would  
19    consider that to be a defective choice of material for  
20    that application.

21    BY MR. KUHLMAN:

22           Q     In your opinion, is this 36000 alloy ever  
23    appropriate to be used in potable water applications?

24           MR. EDWARDS: Object to the form.

25           THE WITNESS: Answer?

1 MR. EDWARDS: If you can.

2 THE WITNESS: Knowing what we know today  
3 about changes that have occurred in water chemistry, it  
4 is not an alloy that I would recommend a manufacturer  
5 utilize for potable water applications.

6 BY MR. KUHLMAN:

7 Q Well, I think you answered a question that  
8 was a little different than what I asked. Is the  
9 C36000 ever an appropriate alloy to be used in a  
10 fitting that goes into a potable water application?

11 MR. EDWARDS: Object to the form.

12 THE WITNESS: It would depend upon a number  
13 of other factors.

14 BY MR. KUHLMAN:

15 Q What factors would that depend on?

16 A For example, it would depend upon the wall  
17 thickness of that fitting. It would depend upon the  
18 level of residual stress in that material. It would  
19 depend upon the microstructure of that fitting perhaps  
20 as to whether or not you would see different behavior.  
21 But knowing what we know today, there would be an  
22 inherent underlying vulnerability to stress corrosion  
23 cracking and dezincification in any potable water  
24 application. So my inclination would be to say that  
25 they would be inherently inappropriate for that

1       **application.**

2           Q     Have you advised anyone at ASTM that you  
3     think that this standard is essentially completely  
4     wrong with respect to that alloy?

5           A     **I have not yet.**

6           Q     Do you plan to do that?

7           A     **I don't have any plans for what I will do in**  
8     **the future, but it is certainly on my radar that there**  
9     **is some concern.**

10          Q     Are there other alloys in the specification  
11     for machined brass that you have concerns about being  
12     used in potable water applications?

13          A     **Any alloy containing greater than 15 percent**  
14     **zinc is going to be vulnerable to dezincification and**  
15     **stress corrosion cracking in a potable water**  
16     **application.**

17          Q     Okay. So is it your opinion that a fitting  
18     that's manufactured to comply with this standard may be  
19     appropriate or it may not be appropriate. It's going  
20     to depend on the environmental factors to which that  
21     fitting is subjected to?

22               MR. EDWARDS: Object to the form.

23               THE WITNESS: Well, it depends in part on  
24     what the manufacturer's holding that fitting out to do.  
25     When you say could it ever be appropriate? Sure. If

1       you're going to use it for a week and that's your  
2       intended goal, to have something that could survive a  
3       week, it might be appropriate for that. But if you're  
4       putting it into a potable water application where  
5       you're advertising it will perform for, you know, 10,  
6       15, 20, 25, 30, 40, 50 years, no, it would not be  
7       appropriate if it has more than 15 percent zinc. It's  
8       going to be vulnerable to dezincification and stress  
9       corrosion cracking occurring over time.

10      BY MR. KUHLMAN:

11           Q       What does that mean, that it would be  
12       vulnerable to dezincification or stress corrosion  
13       cracking?

14           A       **It means that those failure mechanisms are**  
15       **likely to lead to premature failure in those**  
16       **components.**

17           Q       What do you consider to be a failure of the  
18       component?

19           A       **It means that water is allowed to get out of**  
20       **that component, which is designed to retain water, or**  
21       **it becomes weakened or fractured in some manner that**  
22       **allows the fitting to break in two in some cases**  
23       **resulting in high volume loss of water.**

24           Q       So if it fails in such a way that it allows  
25       water to get out of the system, that's a failure?

1           **A     Certainly.  It's designed to retain water.**

2           Q     If water does not escape the system, has the  
3     fitting failed?

4                     MR. EDWARDS:  Object to the form.

5                     THE WITNESS:  It is not a on-and-off switch.  
6     Failure happens through a process.  So we know in this  
7     case, for example, we have fittings that are  
8     experiencing active dezincification corrosion.  I would  
9     describe those as being in the process of failing.  
10    They are failing.  So have they failed?  Yes.  The  
11    failure process has begun.  Have they leaked yet?  Not  
12    yet, but it's coming.  It's a question of time and when  
13    that will happen and what the magnitude of that water  
14    loss will be.

15                    BY MR. KUHLMAN:

16           Q     So I just want to make sure that we're on the  
17    same page so that when I'm using words, I'm using a  
18    word that means the same thing to you that it means to  
19    me.  And I'm trying to understand to you what it means  
20    for a brass fitting to fail.

21                    What is a failure of a brass fitting?  And  
22    let's be specific and let's stick with the fittings at  
23    issue in this case, the NIBCO fittings that were used  
24    in the Meadow plaintiff residences.

25                    MR. EDWARDS:  Objection.  It's asked and

1       answered.

2                   THE WITNESS: I believe I have already  
3       answered that, yes.

4       BY MR. KUHLMAN:

5           Q       Well, I disagree. What do you consider to be  
6       a failure in a NIBCO brass fitting?

7                   MR. EDWARDS: Same objection.

8       BY MR. KUHLMAN:

9           Q       You can answer the question.

10          A       Would you mind reading back my prior answer?

11          Q       You can answer the question.

12          A       I've already said that I believe that a  
13       failure is when any water leaks through that fitting in  
14       any way or the fitting is exhibiting a corrosion  
15       process that would be expected to allow it to leak or  
16       to weaken the fitting such that it would be rendered  
17       vulnerable to cracking or fracturing during service.  
18       The dezincification process clearly weakens the  
19       fittings. Stress corrosion cracking weakens the  
20       fittings. And it also leads to fracture ultimately  
21       leading to water loss. It is not an on-and-off  
22       process. There isn't a moment that we say failure  
23       didn't occur five minutes ago and now it has. It is a  
24       process of failure. And many of the fittings, if not  
25       all of the fittings that we evaluated in this case that

1        **were manufactured by NIBCO, indeed exhibited active**  
2        **dezincification corrosion to some degree or another.**

3            Q        So in your opinion, a NIBCO fitting could be  
4        in use for 50 years, and if it shows any sign of  
5        dezincification, in your mind, it's failed?

6            MR. EDWARDS:    Object to the form.

7            THE WITNESS:    In my mind, it exhibits the  
8        same defective vulnerability to dezincification  
9        corrosion.    All brass fittings containing greater than  
10       15 percent zinc will be universally vulnerable to  
11       dezincification corrosion and stress corrosion  
12       cracking.    And that defective vulnerability exists  
13       whether failure has occurred or not.

14       BY MR. KUHLMAN:

15            Q        Would you agree with me that a vulnerability  
16        to dezincification doesn't necessarily mean that a  
17        fitting is going to fail in such a way that water will  
18        escape from the system during a normal anticipated life  
19        for a fitting?

20            MR. EDWARDS:    Object to the form.

21            THE WITNESS:    We don't have enough experience  
22        yet with NIBCO's PEX fittings to know whether or not  
23        they are all going to fail within a 50-year period or  
24        not.    What we do know is that some of them have failed  
25        in as little as two years.    And what we do know is that



1 all fittings that contain greater than 15 percent zinc  
2 will exhibit that same defect in the design and  
3 material selection and that that defect is present  
4 whether failure occurs or not. That defect is present  
5 whether it ever leaks or doesn't leak or if it leaks  
6 due to some other reason. That defect is still present  
7 in that fitting.

8 BY MR. KUHLMAN:

9 Q So do you have an opinion as to why some  
10 NIBCO fittings have failed and some haven't?

11 A You need to be more specific in your  
12 question, please. I have lots of opinions.

13 Q Well, you said that some of the NIBCO  
14 fittings have failed in two years and some of the  
15 fittings are still actively in service without showing  
16 any signs of dezincification.

17 Do you have an opinion as to why that's true?

18 MR. EDWARDS: Object to the form.

19 Mischaracterizes her testimony.

20 THE WITNESS: It does mischaracterize my  
21 testimony. I don't believe I have said that I did not  
22 see evidence of dezincification in any of the NIBCO  
23 fittings. I believe my report documents that we saw  
24 some evidence of dezincification in every fitting that  
25 we looked at.

1 BY MR. KUHLMAN:

2 Q Okay. Do you have an opinion as to why some  
3 fittings have actually failed in such a way that water  
4 has been released from the system and others only show  
5 signs of dezincification and haven't failed?

6 A I didn't say they hadn't failed necessarily.  
7 I have not excluded the water loss. In fact, I believe  
8 that many of the fittings that did not show  
9 through-wall dezincification within the plaintiff cross  
10 section that we looked at, it did show evidence of  
11 water leakage at the outside surface of the fitting,  
12 which is what caught my eye to begin with to look at  
13 those fittings. So please don't overread into what the  
14 data tells us. I certainly have not within my report.

15 In terms of your question, I would need you  
16 to repeat that for me, please.

17 Q What steps did you take to determine how the  
18 dezincification that you saw on the NIBCO fittings  
19 impacted the strength of the fitting?

20 A Well, some of the fittings broke in two.  
21 They fractured due to stress corrosion cracking. And  
22 some of them had such extensive dezincification  
23 corrosion that they literally were crumbling in any  
24 hands. So there's no question that the strength of the  
25 fitting was detrimentally impacted by dezincification

1       corrosion. I cannot normally break a fitting in my  
2       hands unless it's in a weakened corroded state.

3           Q     For the purpose of my questions moving  
4       forward unless I mention otherwise, when I refer to the  
5       fittings at issue in this case or NIBCO's fittings that  
6       you've analyzed, I'm referring to the materials that  
7       you actually reviewed that came out of the Meadow  
8       plaintiffs' homes. Okay? Or the tubing that came out  
9       of the Meadow plaintiffs' homes. Can we have that  
10      understanding moving forward?

11          A     I don't know that I can accommodate that  
12      understanding. I didn't approach my analysis with that  
13      respect. And I don't know that, as we sit here today,  
14      I am prepared to be able to segregate those.

15          Q     Okay. Well, please do your best. With  
16      respect to the fitting that -- well, first, were there  
17      any fittings that you observed that had failed in such  
18      a way that water had escaped a system in any of the  
19      Meadow plaintiff homes?

20          A     Yes.

21          Q     Really? Which home showed signs of a fitting  
22      failure that caused a water leak?

23          A     I didn't say that they caused a water leak in  
24      the sense that I believe you're trying to define it.  
25      That would be a leak that a homeowner had reported.

1 But there was evidence of water seepage on the exterior  
2 surface of the Plisko fittings. There was evidence of  
3 dezincification corrosion on the exterior surface of  
4 some of the Plisko fittings. It was that evidence that  
5 led me to cross section the fittings where I did.

6 Q Okay. And with respect to the fittings that  
7 you observed out of the Plisko home, did you perform  
8 any testing on those fittings to determine how the  
9 different amounts of dezincification that you saw  
10 affected the strength of those fittings?

11 A No. It's apparent in looking at the  
12 metallographic cross sections that the fittings would  
13 be weakened through that corrosion mechanism.

14 Q And what studies do you rely on to show that  
15 it's apparent that a fitting is weakened simply because  
16 there is some dezincification present?

17 A First of all, the dezincification that was  
18 present in the Plisko fittings extended more than  
19 50 percent through the wall of the fitting. Secondly,  
20 we don't need to do a separate study to do that. It's  
21 commonly held in published literature that the very  
22 nature of the dezincification corrosion process weakens  
23 the fitting. You are literally leeching zinc out of  
24 that fitting and redepositing a porous copper structure  
25 in its place. When you look at that under the

1       microscope, you see that it is a spongy structure that  
2       is left behind. And lots and lots and lots of  
3       published literature exists to address the detrimental  
4       effects of that.

5           Q     And did you do anything to attempt to  
6       quantify how the strength of the fitting had changed as  
7       a result of dezincification?

8           A     No. There would be no reason to do that.

9           Q     And did you do anything to attempt to  
10      determine when a fitting that was showing signs of  
11      dezincification would ultimately fail in service to  
12      where there would be a water leak?

13          A     The mechanism does not lend itself to that  
14      type of an analysis. What we do know is that in the  
15      Monica residence and in the Medder residence, fittings  
16      have fractured in as little as two years. So empirical  
17      experience in other homes leads us to know that stress  
18      corrosion cracking can cause a fitting to snap in two  
19      in that short of a time frame.

20          Q     And the Monica home that you referenced  
21      there, that's part of the Cole case; is that right?

22          A     That's correct.

23          Q     And the Medder house, that's also part of the  
24      Cole case?

25          A     That's correct.

1           Q     And with respect to the homes in the Meadow  
2     case, none of those fittings had snapped or broken in  
3     such a way that there was a water loss into the  
4     property. Is that fair?

5           **A     Not yet. That's correct.**

6           Q     And you're not able to tell me with any  
7     degree of certainty when those fittings might fail?

8           MR. EDWARDS: Object to the form.

9           THE WITNESS: Thank you. No. Not with the  
10    testing that has been done thus far. We have only  
11    looked at one single plane of cross section to verify  
12    that active dezincification is, in fact, occurring in  
13    those fittings. That plane of cross section was never  
14    intended to reveal the maximum depth or the minimum  
15    depth of corrosion penetration. They were simply meant  
16    to determine whether or not, in fact, there is active  
17    dezincification occurring in those fittings. What we  
18    do know is that in the time that those fittings have  
19    been in service, the dezincification corrosion within  
20    that plane of cross section extends more than  
21    50 percent through wall. So certainly the depth has at  
22    least gone that far.

23           If we were to look in the immediate adjacent  
24    plane, it is quite conceivable that it has already gone  
25    through wall. And, in fact, the exterior appearance of

1 the fitting suggests that, indeed, it had. So based  
2 upon that, we would assume that leakage had occurred in  
3 that fitting and had simply not yet been detected by  
4 the homeowner.

5 When dezincification first goes through wall,  
6 it typically goes through the small plug-shaped area,  
7 and water will tend to wick through and evaporate off  
8 about as fast as it comes out. So that dezincification  
9 corrosion tends to sit there for an extended period of  
10 time before it would ever be noticed by a homeowner or  
11 be reported as a leak.

12 BY MR. KUHLMAN:

13 Q So I'm a little confused by what you just  
14 said because I thought you started out by saying that  
15 the fitting that you observed out of the Plisko home  
16 had more than -- had dezincification going through more  
17 than 50 percent of the fitting, and then I thought you  
18 said that you saw signs that it had gone completely  
19 through the fitting. And I'm trying to understand  
20 which is which.

21 Did you observe dezincification all the way  
22 through the fitting or more than 50 percent?

23 A Yes and yes.

24 Q Okay.

25 A When you look at the exterior surface of the

1 fitting, it was evident that dezincification had  
2 occurred and that it had penetrated through the wall of  
3 the fitting as evidenced by discoloration of the  
4 exterior of the fitting. When we prepared cross  
5 sections, the cross sections demonstrate that it  
6 extends at least 50 percent through the wall of the  
7 fitting in that plane of cross section.

8 If you look at any of these polished cross  
9 sections, you will see that dezincification corrosion  
10 typically manifests as a highly variable line of  
11 corrosion. It looks very much like the pattern that  
12 the waves would leave on the sand at the beach. It's  
13 not a uniformly shaped corrosion front. So the depth  
14 varies widely along any outlet of the fitting with  
15 respect to the depth of penetration. It will also vary  
16 circumferentially around the fitting.

17 So you may have, you know, 5 percent depth of  
18 penetration in one area of a polished cross section.  
19 And somewhere else in that very same plane of cross  
20 section, the corrosion may extend at least 50 percent  
21 through wall or even 100 percent through wall as shown  
22 in some of these fittings.

23 Q Is it your opinion that dezincification is a  
24 linear process? So if it starts on day one and it  
25 shows 50 percent by day 50, that by day a hundred, it's



1 going to be all the way through?

2 A No. It would not necessarily be a linear  
3 process.

4 Q And so dezincification can slow down or speed  
5 up as the process is underway. Is that fair?

6 A Dezincification will be influenced by many  
7 different factors within that fitting. And --

8 Q And what factors will impact dezincification?

9 A For example, microstructure can play a big  
10 role in the rate at which dezincification will migrate  
11 through the wall of the fitting. The microstructure in  
12 and of itself is not necessarily a causative agent but  
13 it will, in fact, affect the rate of growth through the  
14 wall of the fitting. If you have a high degree of beta  
15 phase in any portion of that fitting, the  
16 dezincification will move very quickly through the beta  
17 phase portions of the alloy in comparison to the alpha  
18 portions of the microstructure.

19 Q Okay. Are there environmental factors that  
20 can affect the speed with which dezincification will  
21 occur?

22 A There can be.

23 Q Such as?

24 A Such as if you have something that would  
25 change your oxygen concentration in the system. Those

1 types of changes could locally at an area of the  
2 fitting cause dezincification to initiate a little  
3 sooner or initiate a little later. Again, it's not  
4 going to be a causative factor but it could influence  
5 the rate locally. If you were to have something, for  
6 example, stick to the wall of the fitting, it could  
7 cause that little area to behave differently from  
8 surrounding material.

9 Q Okay. What is an acceptable corrosion rate  
10 for plumbing materials in water?

11 MR. EDWARDS: Object to the form.

12 THE WITNESS: There's no universal answer to  
13 that question.

14 BY MR. KUHLMAN:

15 Q How would you answer the question?

16 MR. EDWARDS: Same objection.

17 THE WITNESS: I would not answer that  
18 question. That's an ill-defined question. Could you  
19 please be more specific?

20 BY MR. KUHLMAN:

21 Q Is any corrosion in a brass plumbing fixture  
22 acceptable in your opinion?

23 MR. EDWARDS: Object to the form.

24 THE WITNESS: In my opinion, the fittings  
25 need to perform as the manufacturer has advertised that

1       they will perform. And in this case, NIBCO's fittings  
2       did not.

3       BY MR. KUHLMAN:

4           Q       And how many fittings do you contend that  
5       NIBCO sold that did not comply with what NIBCO was  
6       saying about how long they would last?

7           MR. EDWARDS: Object to the form.

8           THE WITNESS: It is my opinion that none of  
9       the NIBCO fittings that were manufactured using brass  
10      alloys containing greater than 15 percent zinc were  
11      suitable for the intended application and that all of  
12      them were defectively designed.

13      BY MR. KUHLMAN:

14           Q       That's a different question. We were talking  
15      about fitting performance, and then you changed into a  
16      fitting being defective. And I'm asking you how many  
17      NIBCO fittings that you observed failed to meet the  
18      performance standards that NIBCO outlined?

19           A       **I don't know that I'm prepared to answer that**  
20      **question without reviewing the data in the report.**

21           Q       And what's your opinion with respect to how  
22      NIBCO advertised these fittings?

23           A       **NIBCO advertised them as being suitable for**  
24      **the PEX plumbing application. They have advertised**  
25      **their plumbing systems as being reliable, as being**

1       suitable for aggressive water applications. They've  
2       advertised them as being warranted by their company, to  
3       be free of any manufacturing defects or material  
4       defects for a period of 25 years if NIBCO products are  
5       used in the system, solely NIBCO products. And, in  
6       fact, these plumbing fittings are failing in as little  
7       as two years.

8               Q     How many fittings have you observed that have  
9       actually failed, NIBCO fittings?

10              A     All of them exhibit the evidence of the  
11       failure process.

12              Q     How many?

13              A     We'd have to go back and look and see how  
14       many were analyzed. I don't know the answer to that as  
15       we sit here.

16              Q     So the only fittings that NIBCO sold that  
17       you've analyzed would be the ones that are in the homes  
18       at issue in these two cases -- is that fair? -- in the  
19       Cole and the Meadow case?

20              A     I don't know that those are the only ones  
21       I've analyzed. I've analyzed components from other  
22       cases as well.

23              Q     Okay. And were you looking at those  
24       components to see if the fitting showed signs of  
25       dezincification?

1           A     I have noticed signs of dezincification in  
2     many of those components whether I was asked to  
3     specifically look for that or not.

4           Q     Okay. I'm trying to understand the facts and  
5     the data that you're relying on for your opinions. And  
6     you're saying that every fitting that you've looked at  
7     has shown some signs of dezincification. And I'm  
8     trying to figure out what that means. How many  
9     approximately have you looked at that showed signs of  
10    dezincification?

11           MR. EDWARDS: Object to the form.

12           THE WITNESS: I do not know the number of  
13    fittings without reviewing the report and counting them  
14    and looking at how many we've analyzed here and how  
15    many were analyzed at ESI with me present to observe  
16    that analysis. I don't know the answer to that  
17    question as I sit here.

18           What I do know with certainty is that the  
19    number that we have looked at is irrelevant to the  
20    defect that exists in those fittings. NIBCO has  
21    affirmed that they made many, many fittings using  
22    alloys that contain greater than 15 percent zinc and  
23    that all of those fittings will exhibit the same  
24    inherent vulnerability to dezincification corrosion and  
25    that every fitting that we have looked at, in fact,

1       showed evidence of active dezincification corrosion.

2               So your questions are a little -- I'm not  
3       sure I understand what you're asking me, what you would  
4       want me to tell you differently. You seem to feel like  
5       I have an answer to your question. Maybe I don't  
6       understand it.

7       BY MR. KUHLMAN:

8               Q       How many fittings have you looked at that  
9       NIBCO manufactured that exhibited signs of  
10       dezincification?

11               MR. EDWARDS: Object to the form.

12               THE WITNESS: I do not know.

13               MR. EDWARDS: It's asked and answered.

14       BY MR. KUHLMAN:

15               Q       And would it be safe to say that it's under a  
16       hundred?

17               A       **I believe that it could be under a hundred.**  
18       **I can't say with certainty that it is.**

19               Q       Could you say with certainty that it would be  
20       under 200?

21               A       **Not with certainty. Not if I look at the**  
22       **full scope of what I have seen of NIBCO fittings**  
23       **through the course of my career.**

24               Q       And how many NIBCO fittings have you actually  
25       analyzed with a microscope to actually see what type of

1 dezincification might be present?

2 **A I don't need to analyze them with a**  
3 **microscope to see if dezincification is present.**

4 Q Okay. Is any amount of dezincification in a  
5 fitting okay?

6 MR. EDWARDS: Object to the form as to what  
7 is meant by "okay."

8 THE WITNESS: I would agree. Could you  
9 please clarify what you mean by "okay"?

10 BY MR. KUHLMAN:

11 Q Is there any amount of dezincification in a  
12 fitting that you believe wouldn't necessarily impact  
13 the performance of the fitting during its anticipated  
14 life?

15 **A No.**

16 Q How do you define a fitting's anticipated  
17 life for NIBCO? For NIBCO's fittings, how do you  
18 define at what point it has performed to its life  
19 expectancy?

20 **A I'm not certain I'm understanding you. Could**  
21 **you please restate that?**

22 Q At what point has a NIBCO fitting that was  
23 used in a 1006 system performed to its expectation?

24 MR. EDWARDS: Object to the form.

25 THE WITNESS: Specific to the fitting?

1 BY MR. KUHLMAN:

2 Q Mm-hmm.

3 A Certainly -- if I were buying that fitting to  
4 put into my house, I would certainly expect it to last  
5 as long as the manufacturer has advertised and what  
6 they have warranted. So if a manufacturer tells me  
7 they're warranted for 25 years, that suggests to me  
8 that the manufacturer has an expectation that their  
9 product will perform at least that long.

10 Q And when you say that it will last as long,  
11 does it mean that it won't fail in such a way that you  
12 have a water leak?

13 A I would certainly expect my plumbing system  
14 not to leak water if the manufacturer tells me it's  
15 going to hold water for at least 25 years.

16 Q So if you have a system in a house and it  
17 performs without a water leak for 25 years, at that  
18 point in your mind the NIBCO fittings that were used in  
19 that system would have met their obligation, if you  
20 will?

21 MR. EDWARDS: Object to the form.

22 THE WITNESS: I don't believe that was the  
23 question that you had asked me previously. And I don't  
24 know that I would necessarily wholly agree with that  
25 statement.



1 BY MR. KUHLMAN:

2 Q Earlier when we were talking about alloys,  
3 you mentioned knowing what we know today, you would  
4 advise against the use of C36000 alloy in plumbing  
5 components. And I'm curious what you mean by "knowing  
6 what we know today." Has something changed over the  
7 last 10 years such that that alloy is no longer  
8 appropriate but may have been appropriate 10 years ago?

9 A The vulnerability to dezincification, stress  
10 corrosion cracking is dependent upon the alloy  
11 chemistry. All brass fittings that are made with more  
12 than 15 percent zinc will exhibit that same  
13 vulnerability to dezincification corrosion and stress  
14 corrosion cracking. That is true and always has been  
15 true.

16 What has changed that has influenced  
17 particularly stress corrosion cracking behavior more so  
18 than dezincification -- in fact, one could argue not at  
19 all with dezincification -- with stress corrosion  
20 cracking in particular, we know that the introduction  
21 of chloramines and the increases in chlorine levels  
22 that are used and the urban sprawl effect that  
23 influences chlorine depletion and the depletion of  
24 chemical treatments that are added to water affects the  
25 water chemistry. We know that the water chemistry

1       today is different from what it might have been 50 or  
2       60 or 70 or 80 years ago.

3               That being said, we also know that NIBCO's  
4       brass fittings have failed even in the absence of  
5       chlorinated water or chloramines. It has failed even  
6       in well water where no chemical agents have been added  
7       to the water.

8               Q     So with respect to additional knowledge in  
9       the industry, have you learned anything over the last  
10      10 years that impacts your opinion on whether or not  
11      the alloy C36000 would suffer from dezincification when  
12      used in potable water service?

13              MR. EDWARDS: Object to the form.

14              THE WITNESS: I'm not sure I understood it.  
15      Could you say it again, please?

16      BY MR. KUHLMAN:

17              Q     Has anything changed? Have you learned  
18      anything over the last 10 years that would suggest to  
19      you that using the alloy C36000 may not be appropriate  
20      because it will be more likely to experience  
21      dezincification than what you would have expected  
22      10 years ago?

23              MR. EDWARDS: Same objection.

24              THE WITNESS: The one trend I have seen in  
25      the past 10 or 15 years that I think has influenced

1 things is a lot of our production for these commodity  
2 plumbing fittings has moved overseas. Many of them are  
3 being manufactured in countries that don't seem to  
4 demonstrate the same commitment to quality that has  
5 typically been demonstrated by American companies in  
6 the past. We are seeing far more fittings come out of  
7 the manufacturing process with higher levels of  
8 residual stress from machining with dull tools. We're  
9 seeing them come out of the manufacturing process in  
10 some cases with detrimental amine-related compounds  
11 that had been introduced during the manufacturing  
12 process that have initiated the stress corrosion  
13 cracking process.

14 We have also seen in many cases fittings that  
15 are coming out with a very high level of trace  
16 contaminants in the alloy that we did not typically see  
17 many years ago. We're seeing the introduction of more  
18 minor constituents in the alloys that play a very big  
19 role in the dezincification and stress corrosion  
20 cracking in those alloys. Again, that's all about  
21 alloy chemistry. And none of those things would be  
22 able to lead to dezincification or stress corrosion  
23 cracking if the alloy did not contain greater than  
24 15 percent zinc.

25 BY MR. KUHLMAN:

1           Q     And I'm not sure you actually answered my  
2     question there.

3           A     I believe that I did. So if we need to  
4     clarify --

5           Q     I'm asking specifically about this particular  
6     alloy, this C36000 alloy. Assuming it's manufactured  
7     properly and to standard, did you learn something over  
8     the last 10 years that would suggest to you that, well,  
9     this is more prone to dezincification than we would  
10    have thought 10 years ago?

11          A     Yes. For the reasons that we just stated.  
12    We are seeing 360 brass alloys that are coming back  
13    with a higher degree of continuous beta phase, which is  
14    related to the way the material is heat treated during  
15    manufacturing. We're also seeing them come back with a  
16    higher level of trace constituents in the alloy that  
17    may still conform to the standard, but it's still  
18    higher than what we've seen before. We see them often  
19    come back with a higher level of iron than what we've  
20    seen in the past. And all of those things influence  
21    the corrosion behavior of that alloy. And the residual  
22    stress that's introduced during manufacturing plays a  
23    pivotal role in the stress corrosion cracking  
24    vulnerability.

25          Q     And so the fitting may comply with the

1 standard and still show signs of these residual  
2 stresses or detrimental amine compounds, trace  
3 contaminants, et cetera, the things you just mentioned.

4 MR. EDWARDS: I think she was still in the  
5 middle of giving her answer when you jumped in there.  
6 I just ask that we let her finish her answer, please.

7 THE WITNESS: Yes, I was. And I've lost my  
8 train of thought.

9 Would you mind reading back what I said,  
10 please?

11 (Record read as requested.)

12 THE WITNESS: So the answer to your question  
13 is yes, I have seen things that have changed. All of  
14 that aside, you're focusing on 360 brass materials when  
15 that is not even the only material that would contain  
16 greater than 15 percent zinc. All of those things are  
17 exacerbating conditions. But the underlying issue  
18 related to the vulnerability of those fittings is zinc  
19 content.

20 When you get that zinc content down below  
21 15 percent, the materials are generally regarded as  
22 immune to dezincification and stress corrosion cracking  
23 in most applications including potable water  
24 applications.

25

1 BY MR. KUHLMAN:

2 Q Okay. Let's just cover some of these other  
3 alloys really quickly. In Section 5.1.4, it talks  
4 about forged brass. And would you agree that NIBCO  
5 utilized, let's see, C36500 and C37700 for its  
6 forgings?

7 A Again, I would need to reference the actual  
8 chemical analysis results. I don't recall the alloy  
9 compositions as we sit here.

10 Q Is it your opinion generally that NIBCO  
11 failed to manufacture its fittings in compliance with  
12 F1807?

13 A No, not necessarily. Some of them may not  
14 have complied. But certainly the failure mechanism is  
15 not dependent upon compliance or not complying with the  
16 standard. NIBCO had a variety of material options at  
17 their disposal. They chose the material that they were  
18 going to use and they represented what their life  
19 expectation was for that material when they marketed  
20 and sold the product. The fitting as sold did not  
21 exhibit suitable material composition to withstand the  
22 intended service environment.

23 Q So compliance with the standard is not  
24 particularly relevant to your opinions --

25 MR. EDWARDS: Object to the form.

1 BY MR. KUHLMAN:

2 Q -- with respect to alloy selection?

3 A Compliance with the standard is inadequate to  
4 ensure that the material is going to perform as  
5 intended.

6 Q When you say some of the fittings may not  
7 have complied with the standard, just speaking broadly  
8 with respect to all NIBCO fittings, have you done any  
9 type of analysis of the documents to determine what  
10 percentage of NIBCO's fittings that were sold during  
11 this 2006 to 2012 time period failed to meet the F1807  
12 standard?

13 A I have not.

14 Q Do you have any opinion on that?

15 A Not as we sit here today.

16 Q And I assume based on what you just said that  
17 it's your opinion that using these higher zinc content  
18 brasses and forged brass fittings is also  
19 inappropriate?

20 A Correct.

21 Q And is that something that you have advised  
22 anyone at ASTM about?

23 A Not yet.

24 MR. EDWARDS: Kevin, are you at a good  
25 stopping point? It's 10:20 now. I think it's time for

1 a break.

2 MR. KUHLMAN: Let's take a break.

3 (Off the record 10:21 a.m. to 10:39 a.m.)

4 BY MR. KUHLMAN:

5 Q We're back on the record after a short break.

6 I'd like to circle your attention back over to

7 Exhibit 4, the ASTM F1807. And if you could, please

8 turn to the fourth page of this document and look at

9 Section 9.1.1 for me. It's labeled "Crimping

10 Procedure."

11 A It's actually labeled "Crimp Joints."

12 Q 9.1.1?

13 A 9.1.1. Thank you. "Crimping Procedure." I  
14 see it.

15 Q Is a proper crimp important to the  
16 performance of a fitting?

17 A No. Not for the fitting itself.

18 Q Why is a proper crimp important?

19 MR. EDWARDS: Object to the form.

20 THE WITNESS: Could you be more specific,  
21 please?

22 BY MR. KUHLMAN:

23 Q Is a proper crimp important to the

24 performance -- are proper crimps on the fittings and

25 the crimp rings important for the performance of a



1 plumbing system?

2 MR. EDWARDS: Same objection.

3 THE WITNESS: Could you clarify? I'm not  
4 sure what you mean when you say it's important to the  
5 plumbing system.

6 BY MR. KUHLMAN:

7 Q You understand what a crimp ring is; right?

8 A Of course.

9 Q And is it important to properly put that on  
10 the tubing?

11 A It is important for certain reasons to put it  
12 on the tubing --

13 Q Is it important to follow an appropriate  
14 procedure when doing that process?

15 A It is important that you have a crimp that is  
16 properly placed to create an adequate seal and properly  
17 crimp to sufficiently seal the pipe against the sealing  
18 barbs on a fitting to create a watertight seal.

19 Q So why is that important?

20 A Because if you don't create a watertight  
21 seal, it won't hold water.

22 Q And the standard states that "The crimp ring  
23 shall be positioned on the tubing so the edge of the  
24 crimp ring is one eighth to a quarter inch from the end  
25 of the tube."

1                   Is that your understanding of where a crimp  
2                   ring needs to be positioned when you perform a proper  
3                   crimp?

4                   **A     The standard states that "The crimping shall**  
5                   **be positioned on the tubing so the edge of the crimp**  
6                   **ring is one eighth to one quarter inch, 3.2 to**  
7                   **6.4 millimeters, from the end of the tube."**

8                   **It is important to ensure that it's**  
9                   **positioned properly over the sealing barbs to achieve a**  
10                  **seal, which is why that language is in there.**

11                  **Q     And is it important that installers comply**  
12                  **with this requirement?**

13                  **A     If they want to achieve a watertight seal,**  
14                  **yes.**

15                  **Q     That's important in a plumbing system; right?**

16                  **A     Certainly.**

17                  **Q     To have a watertight seal?**

18                  **A     Yeah.**

19                  **Q     You mentioned your plumbing system earlier.**  
20                  **If you went to your plumbing system, you would want --**  
21                  **if you had PEX crimp rings, you'd want them to be**  
22                  **positioned in accordance with the standard. Fair?**

23                  **A     I would want them to be positioned in**  
24                  **whatever manner is needed to achieve a watertight seal.**  
25                  **That's what I would care about.**

1           Q     And do you have an opinion about what happens  
2     if an installer fails to comply with this standard and  
3     the crimp ring is not placed in that range?

4           A     With respect to what?

5           Q     With respect to NIBCO fittings, what would  
6     happen?

7           A     That's a very broad question. I don't know  
8     what you mean when you say "what would happen."

9           Q     Would it decrease what you would expect -- if  
10    the crimp ring is not properly placed on the fitting,  
11    would you expect there to be a watertight seal?

12               MR. EDWARDS: Object to the form.

13               THE WITNESS: There can be.

14    BY MR. KUHLMAN:

15           Q     And would you expect that watertight seal to  
16    last as long as a properly placed and crimped ring?

17           A     It certainly can.

18           Q     But it certainly couldn't as well. Is that  
19    fair?

20           A     It is possible that, if it is outside of that  
21    tolerance, it might not seal. It would depend upon how  
22    far out of tolerance it is. It's a range. And  
23    certainly I have seen plumbers miss the mark and still,  
24    you know, manage to achieve a seal that lasted for a  
25    very, very long period of time with no problem.

1           I've seen other cases where they completely  
2 miss the mark and it didn't seal from day one. It  
3 depends upon how far off they are and so forth as to  
4 whether or not they will adequately compress the pipe  
5 against the sealing barbs.

6           Q     So with respect to NIBCO fittings, how far  
7 out of tolerance is sufficient to create an appropriate  
8 watertight seal in your opinion?

9           A     I haven't looked at these fittings for that  
10 purpose. What I have looked at is the incident  
11 hardware. I've examined the pipe. I've examined the  
12 fittings. I've examined the witness marks inside the  
13 pipes to determine if, in fact, a proper seal was  
14 achieved. And I have examined the fittings, the pipe,  
15 and the clamps to determine if the manner of  
16 installation influenced the failure mechanisms that are  
17 at issue in this case.

18          Q     Can a leak occur in plumbing if the crimp or  
19 clamp is not installed properly?

20          A     Sure.

21          Q     Would you agree that the crimp or clamp seals  
22 the fitting to the tube assembly?

23          A     The crimp or the clamp would be utilized to  
24 seal the assembly, yes.

25          Q     Is the first barb in an F1807 fitting a

1 sealing barb?

2 A Define, please, what you mean when you say  
3 "first barb." Do you have a picture that you're  
4 referring to?

5 Q Are you familiar with what a fitting looks  
6 like?

7 A Yes, Kevin. After working with PEX plumbing  
8 systems for 16-plus years, I'm familiar with what a  
9 fitting looks like.

10 Q And are you familiar with the number of barbs  
11 that are on the fitting?

12 A I am familiar with the design of the fitting.  
13 I'm not sure that we use the same terminology. So  
14 please clarify for me.

15 Q The first barb from the outside working in.

16 A Could you please point me to a picture and  
17 identify exactly what you're referring to so that I can  
18 ensure we're on the same page?

19 Q Have you seen the barbs on a fitting before?

20 A Yes.

21 Q How would you define the first barb?

22 A I define them from the end of the outlet.  
23 But we may not define them in the same way. There's a  
24 picture in the ASTM standard on Section 7, Figure 1,  
25 that shows the barbs on the end of the fitting. If you

1       **could show me what you're referring to when you asked**  
2       **the question, that would be appreciated.**

3           Q       So it's your position that -- just the  
4       question, "Is the first barb a sealing barb?" is too  
5       vague for you to answer?

6           **A       Yes.**

7           Q       How did you eliminate workmanship and  
8       installation issues from your analysis as a potential  
9       cause of a failure in a fitting?

10               MR. EDWARDS: Object to the form.

11               THE WITNESS: Could you please clarify what  
12       you're asking?

13       BY MR. KUHLMAN:

14           Q       You said that you looked at installation  
15       practices on a fitting to see if they played a role in  
16       the failure. Did I hear that correctly?

17           **A       If you could point me to where you're**  
18       **referring in my report, I'd be happy to review the**  
19       **specific language that you're referring to. I looked**  
20       **at all of the plumbing assemblies to determine if any**  
21       **improper installation contributed significantly to the**  
22       **root cause of failure.**

23           Q       And did you determine that any installation  
24       failures contributed to the failure of any fittings?

25           **A       I did not find any evidence of any**

1        installation issue that contributed significantly to  
2        the cause of failure for the fittings.

3            Q        And which of the Meadow plaintiff homes, in  
4        your opinion, had a fitting failure?

5            A        Susan Plisko was the only -- the Pliskos are  
6        the only plaintiffs in the Meadow case who had brass  
7        fittings that were available for inspection. The  
8        Meadow residence had already been completely replumbed.  
9        The McLaughlin residence did not utilize NIBCO brass  
10       fittings. So of the three plaintiffs, named plaintiffs  
11       associated with the Meadow class action, the Plisko  
12       residence was the only residence that had NIBCO brass  
13       fittings in it for examination.

14           Q        And were you able to observe those brass  
15       fittings as they were positioned in service?

16           A        There were some brass fittings that were in  
17       service that we were able to observe.

18           Q        Do you recall how many?

19           A        I don't recall off the top of my head how  
20       many. What I do know is that dezincification corrosion  
21       and stress corrosion cracking, which are the failure  
22       mechanisms that are occurring in those brass fittings,  
23       are not in any way caused by installation issues. The  
24       installation issues that you have addressed thus far in  
25       terms of placement of a clamp over the fitting would

1 not in any way significantly influence, let alone  
2 cause, dezincification. That is an alloy composition  
3 issue. So any influence at all from the manner of  
4 installation would be negligible at best in terms of  
5 influencing dezincification corrosion or stress  
6 corrosion cracking.

7 Q Aside from a failure associated with  
8 dezincification, a fitting could leak if there's not a  
9 proper seal; right?

10 A A fitting can leak due to a variety of  
11 conditions that are not at issue in this case.  
12 Somebody could drill a hole in a fitting. But just  
13 because it can leak or maybe even did leak due to a  
14 different mechanism tells us absolutely nothing  
15 regarding the inherent defect in the design of that  
16 fitting.

17 Q If a fitting leaks for a reason other than  
18 dezincification, like if there's an improper crimp or  
19 some other improper installation practice that causes a  
20 leak, is that something that NIBCO should be held  
21 responsible for?

22 MR. EDWARDS: Object to the form.

23 THE WITNESS: You're asking me to render a  
24 legal opinion that is not for me to render. From a  
25 technical perspective, it seems that you are confusing



1 the manifestation of a leak with the presence or  
2 absence of an underlying defect that was there at the  
3 point of sale. These fittings are inherently  
4 universally defective in design. They are inherently  
5 and universally vulnerable to dezincification and  
6 stress corrosion cracking in potable water  
7 applications. And whether or not coincidentally a  
8 plumber may have had an installation defect that  
9 allowed it to leak for some other reason has absolutely  
10 no bearing on that vulnerability at all. It simply  
11 would indicate that there are two competing processes  
12 going on that could have allowed that fitting to leak  
13 and one process manifested faster than the other.  
14 They're not related.

15 BY MR. KUHLMAN:

16 Q But that could happen where there's two  
17 different processes working and the one unassociated  
18 with the design of the fitting happens to cause a leak  
19 first. I mean, that could happen; right?

20 A That could happen in any product. Somebody  
21 could put a nail through one. That can happen. It  
22 could happen from the day they install it. Somebody  
23 could put a nail in one. That doesn't mean that that  
24 fitting wasn't equally defective.

25 Q And failures like that can take time to

1 manifest as well; right?

2 A They can.

3 Q So the simple fact that there is a failure in  
4 a fitting doesn't necessarily mean that that failure  
5 that caused the water to leak was the result of  
6 dezincification. Is that fair?

7 A Certainly components and assemblies can leak  
8 for a variety of reasons. The issue in this case is  
9 whether or not the fittings are inherently defective  
10 and whether or not the leaks that have occurred in  
11 these class actions demonstrate that vulnerability and  
12 resulted from it.

13 In this case the Plisko fittings are failing  
14 due to dezincification corrosion. The Monica  
15 residence, the fittings failed due to the combined  
16 effects of dezincification and stress corrosion  
17 cracking. In the Medder residence, the fittings  
18 failed, snapped in two in two years due to  
19 dezincification and stress corrosion cracking. Those  
20 failures absolutely specifically resulted from the  
21 alloy chemistry. They did not result from improper  
22 installation in any way. Even if they had, however,  
23 they still exhibit the same defect and the same  
24 vulnerability to failure.

25 Q Just because something has a vulnerability to

1 failure doesn't mean it's going to fail. Is that fair?

2 MR. EDWARDS: Object to the form.

3 THE WITNESS: It means it's unsuitable for  
4 the intended application.

5 BY MR. KUHLMAN:

6 Q So to answer my question, just because  
7 something is vulnerable to a failure doesn't mean it's  
8 going to fail. Is that fair?

9 MR. EDWARDS: Objection. Asked and answered.

10 THE WITNESS: It is fair. Not every product  
11 that is defective will necessarily fail. A classic  
12 example of that would be the old Pintos that had a  
13 clear defect in their design. You know, there are a  
14 variety of examples where products are defective that,  
15 you know, maybe by luck or some other factor managed to  
16 perform. But that does not negate the fact that they  
17 were defective.

18 BY MR. KUHLMAN:

19 Q And so you're saying here that the NIBCO  
20 fittings are defective in their design because of the  
21 material selection. Is that fair?

22 A That's correct.

23 Q And the existence of that defect doesn't  
24 necessarily mean that the fitting will fail in such a  
25 way that it will cause a leak?

1           A     It doesn't mean there aren't other failure  
2     processes that can also cause a leak before that  
3     mechanism leads to a leak.

4           Q     But it also doesn't mean that the fitting  
5     will fail and cause a leak as a result of  
6     dezincification?

7                     MR. EDWARDS: Object to the form.

8     BY MR. KUHLMAN:

9           Q     Is that fair?

10          A     I don't know that that is fair based on my  
11     empirical experience with these products. So far every  
12     single fitting that we have looked at that contained  
13     greater than 15 percent zinc manufactured by NIBCO  
14     exhibited active dezincification corrosion to varying  
15     degrees around the circumference and length of the  
16     fitting outlets. Most of them exhibited significant  
17     dezincification in a variety of water conditions and in  
18     a variety of installations and so forth.

19                    So when we're seeing that level of corrosion  
20     happening over a span of only a few years in service, I  
21     would be very, very doubtful that any of them actually  
22     are going to survive the intended period of time  
23     without leaking. Whether they do actually leak or not,  
24     however, that same vulnerability is still there. They  
25     were still in the universally defective condition at

1       the time they were sold.

2           Q       But you can't say with any degree of  
3       certainty how long these fittings will last before a  
4       water leak happens?

5           A       I can say with absolute certainty. They  
6       lasted two years in the Monica residence. I can say  
7       with absolute certainty that they lasted two years in  
8       the Medders residence. I can say with absolute  
9       certainty that in the Plisko residence after six years  
10      we see evidence of through-wall dezincification and we  
11      see evidence of penetration in cross sections extending  
12      at least 50 percent through wall. I can say that none  
13      of the homes that we evaluated had fittings that had  
14      been in service for longer than seven years, and every  
15      one of them showed evidence of active dezincification  
16      corrosion.

17          Q       And with respect to the Plisko home, which is  
18      the only home that's included in the plaintiffs' homes  
19      for this Meadow case, that fitting, although showing  
20      signs of dezincification according to you, has not  
21      failed in such a way that water has leaked?

22          A       I said before water clearly had gone through  
23      the wall of that fitting. We could see that on the  
24      outside of the fitting. It did not manifest as a leak  
25      that was noticed or reported by the homeowner. But

1       **from a technical perspective, yes, there was evidence**  
2       **that water had made it through the wall of the fitting.**

3           Q       Some of the fittings -- some of these NIBCO  
4       fittings that are out there that you're saying are  
5       defective have lasted longer than 10 years in service.

6                   Is that fair?

7           **A       Could you repeat that?**

8           Q       Would you agree that NIBCO has sold fittings  
9       that you are claiming are defective that have lasted  
10      for more than 10 years in service?

11                   MR. EDWARDS: Object to the form.

12                   THE WITNESS: I don't know that to be true.  
13      Maybe they have. I don't know that with certainty as  
14      we sit here today. If you have a particular document  
15      you'd like me to look at, I'm happy to review it.

16                   BY MR. KUHLMAN:

17           Q       Do you know the dates when any of the Meadow  
18      plaintiffs' homes were piped?

19           **A       I do in the report. They're documented. I**  
20      **don't know them off the top of my head.**

21           Q       Okay. We'll get back to the report here in a  
22      little while.

23           **A       Okay.**

24           Q       Let's go back to the question that I asked  
25      because I don't think you answered it. With respect to

1 all the other fittings that were sold across the United  
2 States by NIBCO that have this level of zinc that  
3 you're claiming is defective, the ones that you haven't  
4 seen before, are you able to say with any degree of  
5 certainty how long those fittings will last in service?

6 MR. EDWARDS: Object to the form of that  
7 question and the commentary that preceded it.

8 THE WITNESS: No. I can't say how long those  
9 fittings that I have not looked at would last. What we  
10 can say with certainty is that the fittings at issue in  
11 this case are failing after only six years in service  
12 in the Plisko residence and that they have snapped in  
13 two, resulting in very high volume losses of water in  
14 the Medder residence and the Monica residence after  
15 only two years.

16 Based upon what we have seen in this case, I  
17 would believe that there are a number of failures  
18 happening all over the United States that may or may  
19 not be recognized or reported to NIBCO.

20 Q Do you have evidence of how many failures  
21 that might be or is that just something that you  
22 believe might exist out there?

23 A I don't have anything quantifiable in terms  
24 of numbers. I do know if you go on the Internet and  
25 you Google NIBCO plumbing products, you will find many,

1       many reports of complaints about a variety of plumbing  
2       components that are failing. And not all of those  
3       complaints appear to be in NIBCO's PER database.

4           Q     Do you believe everything you read on the  
5       Internet?

6           A     No. But I believe that those claims are  
7       likely happening.

8           Q     But you don't have any specific evidence of  
9       it -- is that fair? -- other than what's reported on  
10      the Internet?

11          A     I know that what they are reporting is  
12      consistent with my experience in dealing with ASTM  
13      F1807, NIBCO brass fittings in terms of the  
14      descriptions that they offer, and so forth.

15          Q     Is Internet commentary something an expert  
16      would normally rely upon in reaching their opinions  
17      with respect to a product?

18               MR. EDWARDS: Object to the form.

19               THE WITNESS: No. And I did not rely upon it  
20      in reaching my opinions. However, you're asking about  
21      fittings that I have not evaluated. So if we're going  
22      to discuss fittings that are outside the scope of what  
23      I've relied upon, then let's discuss that universally  
24      and completely.

25



1 BY MR. KUHLMAN:

2 Q Well, with respect to the Plisko fitting --  
3 well, okay.

4 Do you know if the original Meadow home had  
5 any brass fittings manufactured by NIBCO?

6 A I do not.

7 Q Okay. Well, all of this got started because  
8 you were talking about an affidavit that you prepared  
9 in a case involving Uponor. And so I'd like to circle  
10 back around to that, to where we started here.

11 So who asked you to prepare an affidavit?

12 A I don't recall.

13 Q Were you doing that for Uponor or for a  
14 different company?

15 A It was done on behalf of Uponor. I don't  
16 recall who specifically asked me to prepare it.

17 Q And where were you working at the time that  
18 you prepared that affidavit?

19 A Metallurgical Technologies.

20 Q And what is Metallurgical Technologies?

21 A It's a consulting firm and material test  
22 laboratory.

23 Q And were you paid -- was Uponor paying  
24 Metallurgical Technologies for the time you spent to  
25 work on that affidavit, or was that something that kind

1 of flowed from your time working at Uponor before that?

2 **A Uponor would have paid Metallurgical**  
3 **Technologies for the time I spent working on that.**

4 Q Were you an employee of Metallurgical  
5 Technologies or a partner or a part owner of some sort?

6 **A I was an employee.**

7 Q What was your title at the time that you  
8 prepared this affidavit?

9 **A I don't recall.**

10 Q Okay.

11 **A I would have to look at my CV.**

12 Q Let's go ahead and do that. I believe it was  
13 on page 74, we said. All right. And this CV indicates  
14 you were the technical manager and senior materials  
15 engineer at Metallurgical Technologies, Inc., from  
16 October of 2007 to June of 2009; is that right?

17 **A That's correct.**

18 Q And were you asked to prepare some sort of  
19 root cause analysis with respect to brass fittings as  
20 part of preparation of that affidavit?

21 **A I had already investigated those brass**  
22 **fittings. I am a former employee of Uponor. And**  
23 **during my time at Uponor, I investigated brass fittings**  
24 **and plastic threaded coupling nuts. And I continued**  
25 **that effort when I went to work for Metallurgical**

1       **Technologies.**

2           Q     And what specific types of brass fittings are  
3     we talking about here that you were analyzing when you  
4     were at Uponor and that that analysis carried over when  
5     you went to Metallurgical Technologies?

6           A     When you say "what specific type," what do  
7     you mean?

8           Q     Are we talking about like Ts or elbows? What  
9     type of fitting are we talking about?

10          A     Yes. All of -- any.

11          Q     Okay. So just brass fittings that would be  
12     used in a PEX plumbing systems?

13          A     These were specifically brass fittings that  
14     were sold to Uponor by Unique Industrial Products as  
15     being compliant with ASTM F1807.

16          Q     Okay. And what was -- what were your  
17     opinions that you reached after analyzing these  
18     1807-compliant brass fittings?

19          A     I don't recall as we sit here today. But if  
20     you have something you'd like me to review, I'm happy  
21     to.

22          Q     Was it your position at that time that those  
23     fittings would have been defective because they  
24     contained zinc levels higher than 15 percent?

25          A     I do not recall as we sit here today what the

1       **issues were in that matter specifically.**

2           Q     Do you believe you would have concluded that  
3     the fittings that Uponor sold were defective because of  
4     their design?

5           MR. EDWARDS:   Object to the form.

6           THE WITNESS:   I do not recall what the  
7     specific issues were in that case or what conclusions I  
8     reached in that case.   That's going back 10 years or  
9     more.

10          BY MR. KUHLMAN:

11           Q     Okay.   Well, sitting here right now, today,  
12     you know that those fittings were compliant with F1807  
13     or at least they were supposed to be.   Based on that  
14     knowledge, would you conclude that those fittings would  
15     be defective because of the alloy selection?

16           MR. EDWARDS:   Object to the form.

17           THE WITNESS:   I believe that those fittings  
18     were not compliant to ASTM F1807.   I believe that that  
19     was part of the issues of the case.

20          BY MR. KUHLMAN:

21           Q     Okay.   And were they not compliant because of  
22     the alloy used?

23           **A     There were issues with the alloy.**

24           Q     Did you -- to the best of your recollection  
25     when you were working at Uponor, did you ever advise

1       them that they shouldn't be manufacturing or purchasing  
2       fittings that used high zinc yellow brass?

3           **A     Yes.**

4           Q     Okay. When did you do that?

5           **A     I don't recall the dates. On multiple**  
6       **occasions.**

7           Q     Multiple occasions. And would you have  
8       written a memo about it? An e-mail? How would you  
9       have communicated that to someone at Uponor?

10          **A     I have no idea as we sit here today. It's**  
11       **unlikely that I would have communicated that in**  
12       **writing, but it's possible that I did.**

13          Q     Okay. And do you know at that time if --  
14       well, let's just back up. Let's talk about your time  
15       at Uponor. Your CV says that you started at Uponor in  
16       July of 2002 and you were there until October of 2007.

17                   Does that sound right?

18          **A     Yes.**

19          Q     And it says you created and managed the  
20       material analysis laboratory at Uponor North America.

21                   And what is the material analysis laboratory?

22          **A     It was an engineering services laboratory**  
23       **dedicated to failure analysis of metals and the**  
24       **extruded injection molded polymers, investigative**  
25       **chemistry, process research and development, and**

1 materials engineering related to warranty claims  
2 resolution and new product development as stated in my  
3 CV.

4 Q Okay. And prior to working at Uponor, did  
5 you at any of these other jobs perform any kind of  
6 failure analysis on any PEX components?

7 A Probably, yes.

8 Q Okay. Which jobs would you have done that  
9 at?

10 A Through Stork Twin City Testing.

11 Q And that was -- you worked at that location,  
12 Stork Twin City Testing, from October 2001 to  
13 July 2002; is that right?

14 A Correct.

15 Q To the best of your knowledge during your  
16 time at Stork Twin City Testing, did you perform  
17 failure analysis on PEX tubing?

18 A I believe that I did.

19 Q Okay. And was any of that NIBCO or CPI  
20 tubing?

21 A I don't recall. It would not have been NIBCO  
22 tubing because NIBCO was not manufacturing tubing at  
23 that time.

24 Q Do you have any recollection of whose tubing  
25 that was?

1           **A     I do not.**

2           Q     Do you remember if that testing had to do  
3     with any certifications or do you just remember doing  
4     it at some point?

5           **A     I have very little recollection of the**  
6     **details of that. I believe that it was a field**  
7     **returned plumbing pipe but I can't even say that with**  
8     **certainty. Again, we're going back to 2001 and 2002.**

9           Q     Okay. So moving forward to Uponor, did you  
10    review and evaluate field returned samples?

11          **A     I did.**

12          Q     Were any of those alleged failures?

13          **A     Yes.**

14          Q     And did you have a process that you employed  
15    when you were working at Uponor to analyze a warranty  
16    return?

17          **A     Can you be more specific with your question?**

18          Q     Did you ever review any field returns that  
19    were part of a warranty claim?

20          **A     Quite certainly, yes.**

21          Q     And did any of those claims involve PEX  
22    products?

23          **A     Yes.**

24          Q     Did any of those claims involve PEX fittings?

25          **A     Yes.**

1           Q     Okay. Did any of those claims involve  
2     F1807-compliant high zinc content yellow brass  
3     fittings?

4           A     They would have involved ASTM F1807 style  
5     fittings that were made from alloys that would be  
6     expected to contain greater than 15 percent zinc.  
7     Whether or not they were compliant with that, I can't  
8     tell you as we sit here today.

9           Q     But to the best of your knowledge when you  
10    were working at Uponor, you did have an opportunity to  
11    review warranty claims involving F1807-type fittings  
12    that would have been made with an alloy including more  
13    than 15 percent zinc. Fair?

14          A     It's fair to say I evaluated field returned  
15    product. Whether they were submitted under a warranty  
16    claim or whether they were submitted by a sales rep to  
17    say, hey, you might want to take a look at this or  
18    whether they were submitted under a tort claim, I  
19    wouldn't necessarily always know.

20          Q     So during that time you did evaluate F1807  
21    fittings that were made with alloys containing more  
22    than 15 percent zinc?

23          A     Yes.

24          Q     And did you universally determine that those  
25    were defective in their design?



1           **A     I don't recall what I would have determined**  
2           **or what I was asked to determine or asked to evaluate.**

3           Q     At any time did you recommend that a warranty  
4           or a plaintiff be paid because they had purchased F1807  
5           fittings that contained more than 15 percent zinc?

6           MR. EDWARDS:   Object to the form.

7           THE WITNESS:   I don't recall off the top of  
8           my head what I would have recommended specifically nor  
9           would I be in a position to be able to disclose to you  
10          what I may have recommended to Uponor beyond what has  
11          been published on the Internet through my affidavit.

12          BY MR. KUHLMAN:

13          Q     Was it Uponor's position when you were there  
14          that any fitting containing more than 15 percent zinc  
15          was defective in its design?

16          **A     I'm sorry.   Ask again, please.**

17          Q     Was it your understanding at Uponor that any  
18          fitting that it sold that contained more than  
19          15 percent zinc was defective?

20          **A     Again, I don't recall what I would have said**  
21          **to them specifically.   You asked earlier if I ever**  
22          **recommended that they use a different alloy.   The**  
23          **answer to that was yes.**

24          Q     Let's circle back to that.   When do you  
25          believe you recommended -- just ballpark it -- that

1       Uponor stop manufacturing fittings using yellow brass  
2       with zinc more than 15 percent?

3           A     I don't recall, first of all. Secondly, I do  
4       not believe that I am at liberty to go into detail  
5       regarding anything that I communicated to Uponor. I  
6       believe that the confidentiality agreement that I  
7       signed when I went to work with them prohibits me from  
8       being able to discuss that in any manner of detail  
9       beyond what has been made public on the Internet.

10           If you would like to provide a copy of that  
11       affidavit that has been made public, I'm happy to  
12       review it and answer any questions you have to about  
13       it. Beyond that, I believe that we would have to put  
14       NIBCO on notice and give them the opportunity to object  
15       to any testimony I render regarding communications I  
16       had with them while working in their employment.

17           Q     Do you have a copy of that confidentiality  
18       agreement?

19           A     Not with me, no.

20           Q     Do you have one at your office?

21           A     I doubt it. I don't recall having a copy of  
22       it with me after I left Uponor.

23           Q     Do you remember what the terms of that were?

24           A     I do not.

25           Q     Do you know that it -- well, all right.

1           **A     But I'm uncomfortable risking violating that**  
2           **without clarifying it.**

3           Q     And you understand that there's a protective  
4           order in place in this case; right?

5           **A     I do, but Uponor's not a party to that**  
6           **protective order.**

7           Q     You understand that a protective order  
8           prevents the disclosure of materials that are marked as  
9           confidential for disclosure to third parties?

10           MR. EDWARDS: Object to the form.

11           THE WITNESS: I understand what I signed. I  
12           do not believe that that alleviates my obligation to  
13           protect Uponor's confidentiality.

14           BY MR. KUHLMAN:

15           Q     And you understand that during the entire  
16           time you were working at Uponor it was selling F1807  
17           style fittings that had zinc in excess of 15 percent;  
18           right?

19           **A     They were selling some fittings that**  
20           **contained more than 15 percent zinc. They also sold**  
21           **fittings that contained less than 15 percent zinc. And**  
22           **they sold fittings that were made from plastics.**

23           Q     And you understand that it sold those  
24           fittings with more than 15 percent zinc the entire time  
25           you were there. Fair?

1           A     That is not correct.

2           Q     Did they stop selling fittings that were in  
3           excess of 15 percent zinc during your employment?

4           A     Let me clarify that. When I first began  
5           working for Uponor, I worked for Wirsbo, which was a  
6           division of Uponor. The division that I worked in did  
7           not sell the higher zinc brass fittings, I believe if  
8           memory serves me correctly, initially. It's -- at a  
9           later point in time they were merged with another  
10          division of Uponor that did offer the F1807 style  
11          insert fittings.

12                   Uponor may have sold higher -- I'm sorry.  
13          Wirsbo may have sold higher zinc alloy fittings of a  
14          different design prior to that merger. I'm not certain  
15          of that. I would have to go back and look at my  
16          records on that. But after the merger, they began  
17          selling the F1807 style fittings that are at issue in  
18          this case.

19          Q     Okay. So was it your opinion when you were  
20          working at Uponor that the design that is specified in  
21          F1807 for fittings containing an excess of 15 percent  
22          zinc was defective?

23                   MR. EDWARDS: Object to the form.

24                   THE WITNESS: Could you clarify your  
25          question, please?

1 BY MR. KUHLMAN:

2 Q Sure. At the time you were working for  
3 Uponor -- so during this 2002 to 2007 time period --  
4 was it your opinion that the design for fittings  
5 outlined in F1807 was defective because it permitted  
6 the use of alloys containing an excess of 15 percent  
7 zinc?

8 MR. EDWARDS: Same objection.

9 THE WITNESS: I don't know that I ever  
10 rendered an opinion that stated that I considered the  
11 design to be defective. I certainly rendered an  
12 opinion that we had some defective fittings that were  
13 defective in their alloy composition. They did not  
14 conform to the requirements of ASTM F1807, and I  
15 recommended that we steer away from alloys that  
16 contained greater than 15 percent zinc. I don't know  
17 that I ever would have said specifically I consider  
18 that to be defective in that role nor do I know that I  
19 was ever asked to assess that.

20 BY MR. KUHLMAN:

21 Q And I'm not necessarily asking what  
22 specifically you told anyone. I'm just saying during  
23 that time period, had you formed an opinion that you  
24 believed that the F1807 fittings were defective in  
25 their design because of the alloy provision that allows

1 for an alloy in excess of 15 percent zinc?

2 A And I'm responding to you and telling you I  
3 don't know that I formed it worded the way you have  
4 worded it either in my head or in a communication. I  
5 don't know that I thought of it that way.

6 What I concluded was, if we manufacture these  
7 fittings with these high zinc alloys based on what  
8 we're seeing, they're going to fail and we should not  
9 be doing that. That was what I concluded, that these  
10 F1807 fittings are going to fail if we manufacture them  
11 from high zinc alloys. That's what I concluded.

12 Q Okay. So during your time at Uponor, it was  
13 your belief that these F1807 fittings that were  
14 manufactured using alloys with more than 15 percent  
15 zinc would have been defective in their design?

16 A Again, I don't think I formed the opinion  
17 worded the way you are wording it now either in my head  
18 or in a communication. What I knew was that I was  
19 empirically seeing dezincification and stress corrosion  
20 cracking issues in those fittings. And that's what I  
21 concluded.

22 Q It was your opinion then that utilizing those  
23 alloys that were in excess of 15 percent zinc was not  
24 the right path for the company?

25 A Correct.

1           Q     All right. It mentions here that you worked  
2     on expert witnessing in litigation-related claims.

3           MR. EDWARDS: Could you --

4           THE WITNESS: I'm sorry. Where are you  
5     looking?

6     BY MR. KUHLMAN:

7           Q     On your CV, discussion of your time at Uponor  
8     North America, it says one of the things you did was  
9     expert witnessing in litigation-related claims. And  
10    we've talked about this affidavit that you prepared  
11    when you were working at Metallurgical Technologies.

12                Did you also serve as an expert witness for  
13    Uponor during your tenure there?

14           A     **I believe so, yes.**

15           Q     And how many times do you remember doing  
16    that?

17           A     **I don't recall.**

18           Q     And do you recall if those expert witness  
19    events involved PEX-related claims?

20           A     **Not that I recall, but I can't say that with**  
21    **certainty.**

22           Q     What about PEX fittings?

23           A     **I believe so. My uncertainty here is falling**  
24    **under when they would have actually disclosed me as an**  
25    **expert. Was that when I worked for Uponor? Was that**

1 after I left and went to Metallurgical Technologies? I  
2 don't know timing-wise when all of that happened. And  
3 I don't know with certainty in what capacity I was  
4 identified, if it was as a consulting expert or as a  
5 testifying expert or if the depositions I gave were as  
6 a fact witness or as an expert.

7 My dedication is to honestly reporting the  
8 facts that as they exist. And I don't put a lot of  
9 time or attention on how someone else has defined my  
10 role. When I'm asked to do something, I do it to the  
11 best of my ability. And if I'm told to show up for a  
12 deposition, I don't answer the questions differently if  
13 I'm a fact witness versus an expert witness. So that's  
14 not something that is important to me or that sticks in  
15 my head.

16 Q Okay. And approximately how many times do  
17 you believe you've testified in a deposition or at  
18 trial with respect to PEX fittings during your time  
19 period at Uponor?

20 A In a deposition?

21 Q Or at trial.

22 A Never at a trial. I believe that there were  
23 at least two, possibly three depositions related to  
24 fittings.

25 Q And did any of those depositions involve the



1 propriety of using an alloy that contained more than  
2 15 percent zinc in a fitting?

3           **A**     At least one of those depositions involved  
4 fittings that would have contained more than 15 percent  
5 zinc. I don't recall, as I've said before, what the  
6 specific issues were or what the specific conclusions  
7 were beyond recalling that one of the issues was  
8 noncompliance with ASTM F1807 with regard to alloy  
9 chemistry. And not all of those fittings were F1807  
10 fittings. At least one of them was a plastic fitting.

11           **Q**     Okay. Did you work with any of the engineers  
12 at Uponor to develop a new PEX fitting that contained a  
13 different alloy that had less than 15 percent zinc?

14           **A**     I would have contributed to design issues  
15 related to different materials and different components  
16 including fittings that would have contained less than  
17 15 percent zinc.

18           **Q**     So if you were going to take this concern of  
19 yours over the content of zinc in the fittings at  
20 Uponor up the chain to someone, who would you have  
21 reported that to?

22           **A**     For what purpose?

23           **Q**     For the purpose of protecting the company  
24 because you believed that this amount of zinc in the  
25 fittings was inappropriate.

1 MR. EDWARDS: Object to the form.

2 THE WITNESS: There are a variety of people  
3 that I may have spoken with with regard to alloy  
4 composition for various purposes depending upon what  
5 question was being asked or what issue was being  
6 addressed. If it was -- there's no single answer to  
7 that question. You're going to need to be more precise  
8 in your question for me to be able to answer that.

9 BY MR. KUHLMAN:

10 Q Who did you tell at Uponor that it shouldn't  
11 be selling fittings that contain more than 15 percent  
12 zinc?

13 A A, I don't recall. And, B, I don't believe  
14 that that is something I could disclose to you even if  
15 I did for the reasons we've already discussed in terms  
16 of the confidentiality order that I signed -- the  
17 confidentiality agreement, I should say, that I signed.

18 Q When you were at Uponor -- I think you told  
19 me this before -- that the quality assurance people  
20 would have been handling certification audits; is that  
21 right?

22 A Generally, yes. They would be the most  
23 likely people. There may have been others as well.

24 Q And would there also have been other people  
25 that handled the testing required for obtaining and

1 maintaining certifications?

2 **A In what respect?**

3 Q Well, would you have been working with either  
4 NSF or IAPMO or UL to ensure that Uponor's products  
5 were certified to the standards and maintained those  
6 certifications?

7 **A That would not have been my responsibility.**  
8 **I would have had peripheral involvement with those**  
9 **organizations and reports generated by them. But**  
10 **working directly with them for the purpose of**  
11 **maintaining certification or obtaining any**  
12 **certification would not have been within the scope of**  
13 **what I did at Uponor.**

14 Q So you might have reviewed the reports that  
15 were generated, but you wouldn't have been dealing  
16 directly with them. Is that fair?

17 **A I did deal directly with them at times on**  
18 **certain issues but not specifically related to**  
19 **certification issues.**

20 Q Did you have the opportunity to review any  
21 NIBCO stainless steel clamps in any of the three  
22 plaintiffs' homes in the Meadow case?

23 **A Not that I recall. I don't believe that they**  
24 **had the stainless steel clamps.**

25 Q At Uponor would you have been the person

1 responsible for saying yes or no on a warranty claim?

2           **A**     **Not solely, no. I would make a technical**  
3     **finding regarding the root cause of failure if a**  
4     **failure had occurred or was at issue and I would**  
5     **communicate that to others in the company who would**  
6     **ultimately make a decision on whether or not to pay a**  
7     **claim.**

8           **Q**     With respect to -- did you review any PEX  
9     tubing failures when you were at Uponor?

10          **A**     **Yes.**

11          **Q**     Did you have a process that you followed in  
12     attempting to determine what the root cause of failure  
13     was?

14          **A**     **Not a universal specific process. The**  
15     **process would vary depending on what was alleged.**

16          **Q**     Were there a few standards, these are things  
17     I'm always going to do?

18          **A**     **Yes. I would always do a visual inspection.**

19          **Q**     Okay. Why?

20          **A**     **Because I need to look at it and see what has**  
21     **happened.**

22          **Q**     And what would you be looking for?

23          **A**     **I would be looking to see if it leaked. And**  
24     **if so, what the leak path looked like and what we could**  
25     **learn from that.**

1           Q     Okay. And would that just be a visual  
2     inspection or would you look at it under a microscope?

3           A     It would depend on what was there. Typically  
4     I would start with a visual inspection and then may go  
5     to a microscope for further information if it wasn't  
6     obvious what had happened.

7           Q     Did you ever do gel testing?

8           A     Yes.

9           Q     Why?

10          A     To determine the gel content.

11          Q     Why is that important?

12          A     Because we certify our product as conforming  
13     to the cross-linking requirements of ASTM F876, and  
14     certain failure mechanisms can occur at different rates  
15     depending upon the degree of cross-linking. And Uponor  
16     wanted to make sure their product was, in fact,  
17     conforming.

18          Q     Okay. How does gel content impact the rate  
19     of oxidation -- oxidative degradation in a PEX tube?

20               MR. EDWARDS: Are we still talking about what  
21     she was doing at Uponor?

22               MR. KUHLMAN: No. This is a different  
23     question. I mean, it relates but it's a follow-up  
24     question to what we're talking about because she just  
25     said that certain factors could impact failure

1 mechanisms. So I'm trying to understand what she's  
2 talking about.

3 THE WITNESS: So to clarify, we're now  
4 talking about the NIBCO PEX 1006 pipe. Is that what  
5 you're asking me?

6 BY MR. KUHLMAN:

7 Q No, I'm not. I'm asking you how the gel  
8 content of tubing --

9 A Whose tubing?

10 Q Any tubing. How the gel content of tubing  
11 relates to the rate of oxidative degradation in a piece  
12 of PEX pipe?

13 A Generally speaking the gel content in and of  
14 itself will not influence oxidation of PEX material to  
15 an appreciable degree. What it will influence is the  
16 rate with which an oxidative crack will grow through  
17 the wall of the pipe.

18 Q Okay. So would a crack propagate through the  
19 wall of the pipe faster or slower if the gel content is  
20 lower?

21 A If the gel content, meaning the degree of  
22 cross-linking is lower, all other things being equal,  
23 the crack will grow more quickly and more easily  
24 through the wall of the pipe.

25 Q And what -- how do you know that?

1           **A     How do I know that? It's a basic fundamental**  
2           **principle of material science.**

3           Q     Okay. Where would I look if I wanted to see  
4           someone who had talked about that before?

5           **A     There are any number of places you could**  
6           **look. Could you be more specific? I would recommend a**  
7           **technical library.**

8           Q     Can you identify any authors who have written  
9           on the subject of the level of cross-linking impacting  
10          the speed with which a crack will propagate through an  
11          oxidated piece of tubing?

12          **A     Not as we sit here today. But the whole**  
13          **reason for cross-linking PEX pipe is to improve the**  
14          **resistance to creep and to improve the strength of the**  
15          **pipe. When an oxidative crack forms, it grows**  
16          **primarily through creep rupture and stress rupture. So**  
17          **when the pipe is cross-linked to a lesser degree, it is**  
18          **less resistant to that propagation mechanism.**

19          Q     At some point as you're cross-linking tubing,  
20          does it become more brittle?

21          **A     I would not call it more brittle. It becomes**  
22          **more rigid and less flexible.**

23          Q     So if we got up into the 80 percent  
24          cross-linked, would that have a slower rate of crack  
25          propagation if the tubing became oxidized than a

1       65 percent sample that was tested?

2                   MR. EDWARDS: Object to the form.

3                   THE WITNESS: It depends on a number of  
4 factors including the specific formulation of the pipe  
5 and the method of cross-linking that is employed. But  
6 as a general trend, generally speaking, the higher the  
7 degree of cross-linking, the stronger that material  
8 becomes and the more resistant to crack propagation by  
9 creep or stress rupture the material becomes.

10       BY MR. KUHLMAN:

11               Q     Are you able to quantify how changes in the  
12 degree of cross-linking below 65 percent impact the  
13 rate of crack growth in NIBCO's PEX tubing?

14               A     **No.**

15               Q     For any PEX tubing?

16               A     **Not quantify it.**

17               Q     Has -- to the best of your knowledge, has  
18 anyone sought to do that as part of a technical paper  
19 or research study?

20               A     **I don't know if anyone has sought to do it or**  
21 **not. I will tell you there are other variables that**  
22 **will influence that that would make such an assessment**  
23 **precarious at best. It would have to be done in a much**  
24 **more controlled way than working with field returned**  
25 **product.**



1           Q     And I'm not talking about with field returned  
2     product. I'm just talking about generally are you  
3     aware of any studies that people have performed to  
4     assess if lower levels of cross-linking -- or to assess  
5     how specifically lower levels of cross-linking impact  
6     crack growth speed?

7           A     I believe that studies have been done  
8     evaluating that. I don't know if it was specifically a  
9     NIBCO pipe and I can't point you to specific studies.  
10    But as I sit here today, I believe I have reviewed  
11    articles that do address that.

12          Q     You can't tell me which ones or who wrote  
13    them?

14          A     Not as I sit here today, no.

15          Q     And do you think those studies that you  
16    reviewed would have addressed the differences, for  
17    example, between 63 percent gel content, 65 percent gel  
18    content and how that difference might impact crack  
19    growth?

20          A     Any differences that would be assessed like  
21    that would be very, very specific to the pipe being  
22    evaluated because of differences in things like  
23    molecular weight in the resin and a variety of other  
24    factors. It would be likely that the answer to that  
25    question would vary certainly from one manufacturer to

1 another and one formulation to another.

2 Q And so you're not aware of anyone doing that  
3 study or a study like that?

4 A As we sit here today, I can't think of a  
5 specific study that has been done to that effect.

6 Q Did you attempt to quantify in any way how  
7 gel content findings lower than 65 percent impacted the  
8 rate with which a failure may have occurred in NIBCO  
9 tubing as part of this Meadow case?

10 A No. No attempt was made to quantify that.  
11 What we do know is that, on average, roughly 22 percent  
12 of the pipe sold by NIBCO did not conform to the  
13 cross-linking requirements of ASTM F876. That's based  
14 upon our cumulative experience with cross-linking  
15 studies done on NIBCO pipe between this case and other  
16 cases that I have been involved in addition to cases  
17 involving other plaintiffs that I was not involved in  
18 directly but have seen reports for. When we look at  
19 them as a whole, roughly 22 percent of the pipes that  
20 have been evaluated and documented in various expert  
21 reports have shown under cross-linking. We know that  
22 some but not all failed pipes will show under  
23 cross-linking.

24 We know that under cross-linking can  
25 influence the rate at which oxidative degradation will

1       manifest as a leak in the pipe. We know that it's not  
2       a necessary condition for failure to occur. We know  
3       that it doesn't in and of itself cause oxidation to  
4       occur. But it would rather be an exacerbating  
5       condition that could influence why some houses might  
6       experience earlier leaks than others.

7           Q     Let me ask you this: I want to circle back  
8       around to this 22 percent number you just gave me. You  
9       mentioned that that number includes pipe samples that  
10      have been tested as a result of ongoing litigation; is  
11      that right?

12           A     I don't believe that's exactly what I said.

13           Q     Or at least claims being made and these are  
14      experts that were hired by either plaintiffs or  
15      claimants who are doing the testing. Is that fair?

16           A     It's based upon testing that I myself have  
17      done in this case, in the Christensen case. It is  
18      based upon testing that NIBCO's experts, ESI, have done  
19      in the Christensen case. And it's based upon testing  
20      that was done in relation to the Pulte Homes case in  
21      San Antonio against NIBCO.

22           Q     So that includes those sources that you just  
23      mentioned and that's how you formed this 22 percent  
24      number. But I want to ask you about some additional  
25      data that I know you have access to and I'm wondering

1       how this fits into your 22 percent number. During the  
2       course of discovery in this and other cases, NIBCO has  
3       produced its gel testing results that it took on a  
4       weekly or a twice-a-week basis over the course of many  
5       years of manufacturing this tubing.

6               Did you consider all those passing results  
7       over the years in assessing the gel content of the  
8       tubing that was going on?

9               A       Well, the number that I threw out was not  
10       related to those test results. I believe my answer was  
11       specific to field returned product. I believe I said  
12       what we know is that roughly 22 percent of these field  
13       returned pipes that have been evaluated have  
14       demonstrated insufficient cross-linking. So that's an  
15       important clarification.

16               Did I consider -- please let me finish my  
17       answer. Did I consider the data that you're referring  
18       to? Yes. I did consider their passing results. I  
19       also considered the fact that Jana documented that they  
20       did not always conform to the cross-linking  
21       requirements of ASTM F876, and that Jana also evaluated  
22       field returned product where they too concluded that a  
23       low level of cross-linking existed in those products  
24       and that low level of cross-linking likely influenced  
25       the rate of propagation to the pipe.

1           Q     So just so we're clear, when you were  
2     testifying earlier you said that you know -- and I  
3     wrote it down. You said 22 percent of the tubing sold  
4     by NIBCO did not meet the gel content requirements.

5                     MR. EDWARDS: Object to the form.

6     BY MR. KUHLMAN:

7           Q     I just want to make sure, that's not your  
8     testimony.

9           A     I don't believe that is what I said. I don't  
10    believe that is what I said.

11          Q     Just so we're clear, your opinion is not that  
12    22 percent of the tubing sold by NIBCO failed to meet  
13    the cross-linking requirement. Is that fair?

14          A     I have not done an assessment of all tubing  
15    manufactured by NIBCO to determine what degree of  
16    cross-linking did or did not conform. What we know is  
17    that roughly 22 percent of the field returned pipe that  
18    has been evaluated for cross-linking demonstrated  
19    unsufficient cross-linking.

20          Q     And those were samples either selected by  
21    plaintiffs or plaintiffs' experts for testing. Fair?

22          A     Some of them were and some of them were also  
23    selected by NIBCO's experts for testing. And those  
24    samples also demonstrated nonconforming cross-linking  
25    in some cases.

1           Q     And if we wanted to look at the data --  
2     right? -- the actual test reports might be the best  
3     source of that data -- is that fair? -- for those other  
4     cases?

5           A     I would like to think that those experts  
6     accurately reported what is in the test reports, but  
7     certainly it would not be a bad idea to look at the  
8     test reports.

9           Q     But you're not able to extrapolate that  
10    number that you've come up with for the field returned  
11    products to the overall amount of tubing sold by NIBCO?

12          A     No. And the important thing to recognize or  
13    remember is that the degree of cross-linking is not  
14    critical to the failure that has occurred in these  
15    pipes. It's an exacerbating condition. It's a  
16    condition that may help explain why some failures occur  
17    sooner or earlier than others in an installation. But  
18    empirical experience has taught very clearly that it is  
19    not a necessary condition for failure to occur. The  
20    underlying inherent defect that has caused these pipes  
21    to fail exists without regard to whether there is or is  
22    not insufficient cross-linking.

23          Q     So what is the underlying defect with the  
24    NIBCO 1006 tubing in your opinion?

25          A     The tubes were insufficiently stabilized and

1       **improperly designed in terms of the whole manufacturing**  
2       **process to allow the tubing to perform as intended in a**  
3       **potable water application.**

4           Q       So what does it mean when you say that the  
5       tubing had an improper design in its manufacturing  
6       process? What does that mean?

7           A       **I believe I've defined that in the report if**  
8       **we can turn to that page. Bear with me while I find**  
9       **it.**

10                  MR. KUHLMAN: Let's go off the record.

11                  (Off the record 11:39 a.m. to 11:44 a.m.)

12       BY MR. KUHLMAN:

13           Q       Okay. We are back on the record after a  
14       short break. And before the break, I'd asked you what  
15       you meant when you used the term "manufacturing design  
16       process for the tubing." And you were going to look in  
17       the report and see if you could find where you talked  
18       about it there.

19                  Have you had a chance to look through the  
20       report?

21           A       **I have.**

22           Q       Are you ready to proceed?

23           A       **Yes.**

24           Q       And so when you say that "The NIBCO PEX was  
25       defective in its design manufacturing process," what

1 does that mean?

2           A     It means as stated on page 17 and 18 of my  
3 report that, when a manufacturer designs their process  
4 by which they make PEX tubing, they have to make a  
5 variety of decisions that will ultimately affect the  
6 performance of that pipe and that will ultimately  
7 determine whether or not the pipe performs as they  
8 expect it to and intend for it to.

9                     Those decisions begin with deciding what  
10 resin they're going to use. For example, not all high  
11 density polyethylene resins or ultra high density  
12 polyethylene resins are created equally. They have to  
13 select what resin they're going to use. They have to  
14 select what method of cross-linking they're going to  
15 use.

16                    There are three different types of PEX on the  
17 market right now. There's PEX-A, PEX-B, and PEX-C.  
18 Those letter designations identify three different  
19 cross-linking processes. And the pipe that results  
20 from those processes have unique properties and they  
21 have unique challenges and unique benefits associated  
22 with each cross-linking process. So that's another  
23 decision that the manufacturer has to make, what  
24 process am I going to rely upon to achieve  
25 cross-linking?



1           Then they have to decide what they're going  
2           to do to protect that material from oxidation in a  
3           potable water service environment because it's  
4           well-known in the industry that polyethylene resins,  
5           high density included, and ultra high molecular weight  
6           polyethylenes included, will degrade in the presence of  
7           potable water if they don't take additional steps to  
8           protect that material.

9           So the manufacturer would decide what do I  
10          need to add? Am I going to add UV stabilizers? Am I  
11          going to add antioxidants? Am I going to add other  
12          compounds that may help extend the life of my pipe? If  
13          so, what I am going to select for those additives? How  
14          am I going to introduce those? How am I going to go  
15          about compounding that material and mixing it?

16          And then they have to make decisions  
17          regarding their extrusion process. What temperature am  
18          I going to operate under? What kind of pressure am I  
19          going to use for my extruder? How am I going to go  
20          about cooling that material? All of those decisions  
21          will ultimately affect the performance of the pipe that  
22          comes out at the end of that process. All of that  
23          together is the manufacturing design for that pipe.

24          Q       Okay. So selecting a resin, that's  
25          essentially picking one of your ingredients for the

1 tubing; right?

2 A One of your ingredients.

3 Q Do you contend that NIBCO 1006 tubing is  
4 defective because of the resin it selected?

5 A That is a part of it.

6 Q Okay. Why?

7 A Well, the resin that they selected was not as  
8 high in molecular weight as it could be. The higher  
9 the molecular weight, the stronger it will be and the  
10 higher resistant it will be in general to cracking. If  
11 the resin that they used according to documents  
12 produced by Total was not a resin that was being  
13 commonly used by other manufacturers in the industry.  
14 According to documents produced by Jana Laboratories,  
15 testing that they performed revealed that the NIBCO  
16 pipe responded uniquely and differently to the e-beam  
17 process than other pipes manufactured by the same  
18 cross-linking process made by other manufacturers.

19 We also know from documents that were  
20 produced by I believe it was Total, although I may be  
21 wrong about that, that this particular resin may not  
22 have even been a pipe-grade resin. So certainly they  
23 had more robust resin options available to them at the  
24 time they began manufacturing NIBCO pipe.

25 Q Okay. And is it your understanding that

1 NIBCO's tubing had to undergo testing so that it could  
2 be marked in compliance with F876?

3 **A Yes.**

4 Q And was some of that testing intended to  
5 address the adequacy of the resin for use in PEX  
6 piping?

7 **A The testing was intended to address the**  
8 **adequacy of the finished product.**

9 Q And based on -- well, let me ask you this:  
10 NSF concluded based on its testing that the resin was  
11 adequate for use in NIBCO's finished product; is that  
12 true?

13 MR. EDWARDS: Object to the form.

14 THE WITNESS: I believe NSF concluded that  
15 the product passed their test parameters, the finished  
16 pipe.

17 BY MR. KUHLMAN:

18 Q And the finished pipe ended up being  
19 certified by NSF?

20 **A That's correct.**

21 Q Okay. So we have the resin. Do you contend  
22 that all PEX-C is defective?

23 **A No.**

24 Q Do you contend that NIBCO shouldn't have used  
25 E-BEAM Services to perform the irradiation on its

1 tubing?

2           A     No. What I contend is that the process that  
3 they were utilizing did not allow them to manufacture  
4 pipe that would survive the intended application for  
5 the advertised and expected period of time. There were  
6 a variety of decisions that influenced the final  
7 properties of that pipe, and I have not made an effort  
8 in this assessment to ferret out the degree of  
9 contribution from each of those different decisions.

10           Q     Okay. Do you contend that e-beam services  
11 failed to properly irradiate the tubing that NIBCO was  
12 selling as its 1006 product?

13           A     I don't know what e-beam did or didn't do. I  
14 haven't evaluated e-beam's process. What we do know is  
15 that pipes manufactured by NIBCO have failed due to  
16 oxidative degradation in as little as one year after  
17 being placed into service when they were advertised as  
18 being suitable for aggressive water applications and  
19 that they were advertised to be free of defects for a  
20 period of 25 years.

21           Q     Okay. But the point is a manufacturer can  
22 use irradiation to make PEX-C in a way that you would  
23 believe is appropriate. That's possible.

24           A     Sure. Other manufacturers have done that.

25           Q     Okay. And so if there was an appropriate

1 resin and there were appropriate antioxidants, the  
2 actual fact that you're cross-linking something doesn't  
3 necessarily make the pipe defective. It's your  
4 position that, with respect to NIBCO's 1006 tubing, the  
5 combination of the resin and the antioxidant package  
6 reacted uniquely to the cross-linking and resulted in a  
7 product that wasn't suitable for potable water  
8 applications?

9 A That is a piece of what made it unsuitable.  
10 If you look at the graph in the report -- in my report,  
11 it is shown -- sorry. I'll have to find it. Where is  
12 it? Here we go. If you would, please turn to page 21.

13 Q Go ahead.

14 A You see two figures here that are copied from  
15 a Jana Laboratory report that is generated on behalf of  
16 NIBCO and provided to NIBCO comparing by OIT --  
17 oxidation induction time -- testing how NIBCO's PEX  
18 products, at least two of them, compared to three other  
19 products that were generated using the PEX-C process.  
20 And you can see graphically that within the wall of the  
21 pipe and around the circumference of the pipe, NIBCO's  
22 product exhibited a much higher degree of variability  
23 in terms of oxidation induction time, which is a  
24 reflection of the degree of stabilization in the pipe  
25 than their competitor products did.

1                   And if you flip to the next page, on page 22,  
2           within a box there is quoted language from that same  
3           report where Jana Laboratories states "Based on the  
4           above, the current NIBCO formulation appears similar to  
5           competitive samples with respect to both the bulk and  
6           circumferential cross-link level albeit with slightly  
7           greater variation for the NIBCO formulation. The OIT,  
8           and by inference, the residual stabilizer level for the  
9           current NIBCO formulation displays much greater  
10          variation than the competitive samples. Ultimately it  
11          was concluded that the circumferential variation in  
12          cross-linking is, in fact, a characteristic of the  
13          electron irradiation process and most likely cannot be  
14          eliminated and did not warrant at this time process  
15          changes to reduce the variation. It was also concluded  
16          that the current NIBCO product formulation has a  
17          characteristically different response to the  
18          irradiation process resulting in the highly variable  
19          OIT values."

20                   (Exhibit 5 Marked for Identification.)

21           BY MR. KUHLMAN:

22                   Q     Let's talk about OIT just for a quick minute  
23           and then we'll circle back to this. Hand you a  
24           document that we'll mark as Exhibit 5. Okay. I have  
25           handed you a document that is marked as

1 Designation D3895; is that right?

2 **A Dash 07.**

3 Q Dash 07. Is there a difference between a  
4 designation and a standard?

5 **A I'm not sure I understand your question.**

6 Q Well, when we looked at F1807, I guess it did  
7 say "designation."

8 All right. Moving forward. Have you  
9 reviewed this standard before?

10 **A I have.**

11 Q Is this the standard that deals with  
12 oxidative induction time of polyolefins by differential  
13 scanning calorimetry?

14 **A Yes.**

15 Q And is -- that oxidative induction time, is  
16 that the OIT testing that you're talking about?

17 **A Yes.**

18 Q And I'd like to ask you to turn the page on  
19 this to the second page of the document where it  
20 says -- actually, let's look at Note 3. I'm just going  
21 to ask you if you agree with this. The standard here  
22 says "There is no accepted sampling procedure nor have  
23 any definitive relationships been established for  
24 comparing OIT values on field samples to those of  
25 unused product. Hence the use of such values for

1 determining life expectancy is uncertain and  
2 subjective."

3 Do you agree with that?

4 **A I agree that that is what that says. And I**  
5 **agree that you cannot use it to determine life**  
6 **expectancy which are the key words from that paragraph.**

7 Q Right. So we can't use OIT testing to  
8 determine the life expectancy of the NIBCO 1006 tubing,  
9 can we?

10 **A That's correct.**

11 Q And would you agree with what it says here in  
12 Note 2 that "Volatile antioxidants may generate poor  
13 OIT results, even though they may perform adequately at  
14 the intended use temperature of the finished product"?

15 Do you agree with that?

16 **A That is correct.**

17 Q Did you make any assessment of the  
18 antioxidants used in NIBCO's 1006 tubing to determine  
19 if any of those antioxidants were volatile antioxidants  
20 that may generate poor OIT test results?

21 **A We have not evaluated specifically their**  
22 **antioxidants. What we have evaluated not in any way in**  
23 **relation to life expectancy or specifically the**  
24 **antioxidant is the uniformity of the distribution of**  
25 **stabilizers within the wall of the pipe, which is not**



1 in contradiction to what you have read. What you have  
2 read is speaking to the magnitude of the height of the  
3 boxes on this graph.

4 What we're referring to is within any given  
5 set of pipe, the distribution, we're not comparing one  
6 pipe to another or different formulations to another.  
7 We're comparing within a given pipe where presumably  
8 the same antioxidants should have been used throughout  
9 since ASTM F876 requires that pipe wall to be  
10 homogeneous and uniform. What we're looking at is,  
11 within that pipe wall, how uniform was the degree of  
12 stabilization. And what we see is that it was not  
13 uniform at all. In fact, it was virtually not existent  
14 at the interior surface of the pipe where the cracks at  
15 issue in this case initiated.

16 Q And as we know from Note 3, the fact that  
17 it's virtually nonexistent at the interior surface  
18 doesn't necessarily mean that that pipe is going to  
19 fail in any set period of time. Fair?

20 A We know empirically that it did fail. We  
21 know empirically that all of the incident pipes at  
22 issue in the case failed multiple times at multiple  
23 locations, in fact, sometimes at hundreds of locations  
24 within only a few inches to a foot of pipe length.

25 Q But we're not using OIT for that purpose, to

1 determine how long it's going to last. Is that fair?

2 A We're not using OIT to in any way quantify  
3 how long it's going to last. Although we should note  
4 for the record that NIBCO's experts, in fact, did do  
5 that incorrectly.

6 Q So the answer to my prior question -- and  
7 this is a yes or no question. Did you check to see  
8 what antioxidants NIBCO used in its 1006 tubing to  
9 determine if any of those antioxidants were volatile  
10 antioxidants that may generate poor OIT results?

11 A No. It is worth noting that this OIT test is  
12 conducted at 200 degrees C. So if those antioxidants  
13 were detrimentally impacted by a 200-degree C exposure  
14 in a short-term OIT test, they would also be expected  
15 to be detrimentally impacted by extrusion temperatures  
16 in excess of 200 degrees C.

17 NIBCO has represented in various documents  
18 and testimony that the extrusion temperature was  
19 anywhere from 40 to 60 degrees higher than the  
20 temperature used in oxidation induction time tests. So  
21 the point that you're making may be very important and  
22 a big part of why the pipe is behaving in the manner  
23 that it is.

24 Q Based on what you just said, are you able to  
25 determine if the extrusion process at the higher

1 temperature depletes all of the antioxidants or if some  
2 remain after the extrusion's done?

3 **A It's very clear that some remains after**  
4 **extrusion. The OIT testing demonstrates that**  
5 **effectively.**

6 **Q** And are you able to determine how much of the  
7 remaining antioxidants are depleted as a result of the  
8 OIT testing?

9 **A No. What we know is that it is non-uniformly**  
10 **distributed within the pipe wall. That is the extent**  
11 **of what we conclude from OIT testing, that it shows**  
12 **relatively very, very little residual stabilization at**  
13 **the interior surface of the pipe in comparison to the**  
14 **degree of stabilization that remains at mid wall within**  
15 **the pipe. And we see that there is also a reduction at**  
16 **the OD surface of the pipe in as-manufactured pipe**  
17 **that's never been exposed to water.**

18 **Q** And you understand that antioxidants within  
19 tubing can migrate from the outer diameter to the inner  
20 diameter as antioxidants at the interior surface of the  
21 tubing are depleted in service.

22 **A For the antioxidant to work effectively, it**  
23 **must be able to migrate and redistribute within the**  
24 **wall of the pipe. It's intended to migrate. These**  
25 **results suggest that their antioxidant maybe was not**

1       migrating very effectively within the pipe wall, and  
2       that may be a piece of the problem.

3           Q       And would you agree with this statement from  
4       the standard: "The OIT measurement is an accelerated  
5       thermal aging test and as such can be misleading"?

6           A       It can be.

7           Q       Okay. And you can't assess the amount of  
8       antioxidants that are depleted as a result of the OIT  
9       test process itself. Is that fair?

10          A       That's correct. Not by itself. There are  
11       other methods that can and have been employed, not by  
12       me but by others, to assess that. For example, Total  
13       at, I think, NIBCO's request analyzed some of the NIBCO  
14       pipe for residual antioxidant by a method known as  
15       HPLC. They reported detecting no antioxidant at the  
16       interior surface, but I personally have not done that  
17       testing.

18          Q       And that testing would be inconsistent with  
19       all of your OIT test results that showed at least some  
20       level of antioxidants at the inner surface; correct?

21          A       I would not call it inconsistent, no. I  
22       don't know what methodology they used. If anything, I  
23       would call it consistent with these results. We  
24       would --

25          Q       So given --

1           A     I'm sorry. May I finish?

2           Q     Sure.

3           A     We would expect in a situation where we see  
4     little to no residual stabilization, it would not in  
5     any way be surprising for them not to detect  
6     antioxidant at the ID surface. In fact, it would be  
7     far more surprising if they did.

8           Q     Well, OIT test results, regardless of what  
9     they show for the NIBCO tubing, you would agree with me  
10    that NIBCO tubing as extruded and as e-beamed, this  
11    1006 tubing was certified by NSF to meet the chlorine  
12    resistance standard for one designation.

13                    You'd agree with that; right?

14           MR. EDWARDS: Object to the form. Compound  
15    question.

16           THE WITNESS: I would agree that CPI obtained  
17    a certification from NSF that included some testing  
18    related to chlorine. Not all of CPI's pipes or NIBCO's  
19    pipes passed the chlorine test. That is clear from the  
20    evidence in this case. But they did manage to maintain  
21    a certification. They did not necessarily maintain  
22    that certification because they were making pipe that  
23    was compliant. They did manage to maintain it for a  
24    variety of reasons that I'll be happy to discuss with  
25    you, but it would be misleading to assume that the fact

1       that they maintained certification in any way implies  
2       that they did not make pipe that exhibited insufficient  
3       resistance to oxidation.

4       BY MR. KUHLMAN:

5           Q     Do you consider yourself to be an expert on  
6       the statistical methods that are used by NSF in  
7       interpreting the data for the F2023 testing?

8           **A     No.**

9           Q     And do you consider yourself to be an expert  
10      on the plastics policies that were in place that  
11      addressed how that data was to be interpreted in order  
12      to assess if tubing passed the test?

13           MR. EDWARDS:   Object to the form.

14           THE WITNESS:   I don't understand your  
15      question.

16       BY MR. KUHLMAN:

17           Q     Do you consider yourself to be an expert in  
18      the specific standards that pertain to chlorine  
19      resistance testing and how the policies that NSF  
20      employs impacts the assessment of tubing that's tested  
21      pursuant to those standards?

22           MR. EDWARDS:   Same objection.

23           THE WITNESS:   I can't speak to NSF's  
24      policies.   I don't work for NSF.   I didn't set their  
25      policies.   You would have to speak with NSF regarding

1       their policies.

2       BY MR. KUHLMAN:

3           Q       You testified just a moment ago that not all  
4       the pipes passed the chlorine resistance test.

5                   Did I hear that correctly?

6           A       That is correct. There's evidence produced  
7       by NIBCO and in this case that demonstrates that.

8           Q       And you would agree with me that NSF, which  
9       is the entity that's responsible for determining if a  
10       tubing passes the test, concluded based on the data  
11       that was available to it that NIBCO's 1006 tubing in  
12       all colors passed the test such that it could be  
13       certified accordingly?

14          A       NIBCO obtained a dependent transfer listing  
15       for the certification from NSF based upon CPI's prior  
16       certification result. That does not imply or mean that  
17       NSF tested all colors of their pipe on an ongoing basis  
18       throughout the duration of time over which these  
19       defective pipes were manufactured. In fact, NSF was  
20       due to perform an audit of NSF's pipe that fortuitously  
21       did not happen. And NSF was very clearly and keenly  
22       concerned that, if that audit happened, there was a  
23       very high likelihood that they would lose that  
24       certification.

25                   Documentation and communication between Jana

1       Laboratories and NIBCO clearly demonstrates that there  
2       was a tremendous amount of time and energy and  
3       handwringing going on associated with that and that  
4       that was the impetus for redesigning their PEX product.  
5       And we see terms in those communications talking about  
6       developing PEX-B as a backup plan in case we lose our  
7       certification and documentation that clearly indicates  
8       that that was a fear if not an expectation.

9               So I don't in any way feel like I can agree  
10       with you that the fact that they maintained a  
11       certification tells us anything about the quality of  
12       what was being produced on an ongoing basis.

13           Q     Let me break it down into real small  
14       pieces --

15           A     Please.

16           Q     -- and I'll try to ask very simple yes or no  
17       questions. And I would appreciate if you would try to  
18       answer in a yes or no fashion as appropriate.

19           A     I will answer as needed to completely and  
20       wholly answer your question.

21           Q     CPI had the entire battery of F2023 tests  
22       performed on its terra cotta product. True or false?

23           A     I don't recall as we sit here to the extent  
24       of that testing. If you have a document you'd like me  
25       to review, I'd be happy to review it.



1           Q     So is it your position right now that you  
2     don't remember which product CPI had tested for F2023?

3           **A     Not as we sit here right now.**

4           Q     Okay. All right. So this doesn't take  
5     forever, I'm going to clean these up while we're at  
6     lunch. So let's circle back to this manufacturing  
7     design issue really quickly if we could. You mentioned  
8     that the extrusion process, the temperatures and the  
9     pressures and the cooling, as things that a  
10    manufacturer needs to consider when assessing how to  
11    manufacture PEX pipe; is that right?

12          **A     Correct.**

13          Q     And those things work into this manufacturing  
14    design process that you described?

15          **A     Correct.**

16          Q     Is it your position that NIBCO had a  
17    problematic extrusion process, that there was something  
18    wrong with it with respect to its 1006 tubing?

19          **A     We know that we do see defects that came out  
20    of the extrusion process that served at preferential  
21    sites for crack initiation and that likely reduced the  
22    time required for cracks to initiate. Yes. We do see  
23    evidence of extrusion defects that entered the process  
24    stream.**

25                **We should add to what I said earlier that the**

1       quality assurance process is also part of that  
2       manufacturing design process. They are supposed to be  
3       inspecting that product to weed out any of that kind of  
4       thing in the field.

5           Q       So you would need to look at a sample that  
6       had failed to determine if there was some manufacturing  
7       defect that impacted the longevity of that tubing?

8           MR. EDWARDS: Object to the form.

9           THE WITNESS: It depends upon what issue  
10      you're talking about. Could you be more specific?

11      BY MR. KUHLMAN:

12           Q       Can you determine if there is an extrusion  
13      line on a piece of tubing if you don't look at it?

14           A       You would have to look at it to determine if  
15      there is an extrusion defect there. That is part of  
16      what the quality assurance program is about, and NIBCO  
17      has internal specifications for that visual inspection  
18      process.

19           Q       And you would need to look at a piece of  
20      tubing to determine if, for example, a piece of, you  
21      know, burnt resin got into the pipe wall and caused a  
22      pinhole of some sort during the irradiation process;  
23      right?

24           A       You're maybe misspeaking a little bit. We  
25      would have to look at it to determine if there was a

1 chunk of charred polymer there. And looking at it  
2 would allow us to determine if that chunk of charred  
3 polymer may have promoted crack initiation. It would  
4 not be fair necessarily to say that we would have to  
5 look at it to determine if it caused a failure. We  
6 know in analyzing this pipe and all of our empirical  
7 experience with pipe that the pipe is wholly  
8 insufficiently stabilized to prevent oxidative  
9 degradation during service in the intended service  
10 environment.

11 The presence or absence of an extrusion  
12 defect of any kind or a manufacturing defect that would  
13 be visually observed does not influence the presence or  
14 absence of that inherent defect. It merely would  
15 affect the rate at which that defect might manifest as  
16 a failure.

17 Q So let me ask you this: The tubing that  
18 NIBCO was manufacturing, this 1006 tubing, are you  
19 saying that NIBCO could have actually performed the  
20 manufacturing process on that resin or antioxidant  
21 package in such a way that it would not have been  
22 insufficiently stabilized?

23 A I don't understand your question.

24 Q Well, is it your opinion that NIBCO's  
25 formulation could be made on a different set of

1 extruders and e-beamed by a different company and it  
2 would have been fine?

3 MR. EDWARDS: Object to the form.

4 THE WITNESS: I have not rendered that  
5 opinion, no.

6 BY MR. KUHLMAN:

7 Q So is your opinion that -- okay. So if  
8 you're going to assess whether something failed as a  
9 result of a manufacturing defect or as a result of  
10 insufficient stabilization, is that something that you  
11 would need to look at the tubing and find out?

12 A Not at this point.

13 Q If a manufacturing defect played a role in  
14 the failure, or would the failure have been caused  
15 because of the insufficient stabilization?

16 MR. EDWARDS: Object to the form.

17 THE WITNESS: The failures that we have  
18 evaluated have clearly universally failed due to the  
19 underlying insufficient stabilization and insufficient  
20 design of manufacture for the tubing to survive in the  
21 intended service environment as advertised and  
22 expected.

23 What we do know is that, if there  
24 coincidentally happens to be a defect of any kind at the  
25 surface that can locally increase the stresses at that

1 location, that that can allow that crack to show up a  
2 little earlier or maybe be oriented differently or be  
3 located in a certain place because of that local stress  
4 riser, but we also know that that is not a necessary  
5 condition for these failures to occur. The bulk of  
6 these failures have occurred in the absence of any such  
7 manufacturing defect. It is the failure process. The  
8 degradation, oxidative degradation process is not  
9 related to the presence of any manufacturing defect.

10 BY MR. KUHLMAN:

11 Q Is a manufacturing defect different than a  
12 manufacturing design defect?

13 MR. EDWARDS: Object to the form. Calls for  
14 a legal conclusion.

15 THE WITNESS: From a technical perspective,  
16 the design includes many, many things beyond the  
17 presence or absence of any kind of a manufacturing  
18 defect and would not really include a manufacturing  
19 defect. One is on the front end of the process and one  
20 is on the back end of the process.

21 BY MR. KUHLMAN:

22 Q Okay. Are you saying that NIBCO's tubing is  
23 insufficiently stabilized because of the manner in  
24 which the antioxidant package was mixed with the resin  
25 and the extruders?

1           A     That's a piece of it but it's not the only  
2     piece of it. It is insufficiently stabilized as a  
3     complete finished product, which includes all of those  
4     parameters, the type of resin that they chose, the  
5     specific antioxidants that they did or didn't choose,  
6     the molecular weight of that resin. It's influenced by  
7     the fact that they were using a beam process that  
8     didn't interact well or in a uniform manner as it has  
9     with other combinations of ingredients. It's about the  
10    level of residual stress that's being imparted into  
11    that material through the manufacturing process which  
12    further influences all of this. It's all of that  
13    together. I've made no attempt to isolate out, as I've  
14    said before, what degree of contribution each of those  
15    aspects may have had with the total problem that exists  
16    in the pipe.

17               What we know is that that combination of  
18    design parameters for the process did not allow them to  
19    achieve a pipe that could withstand the intended  
20    service environment as advertised. Clearly that pipe  
21    is not chlorine resistant and suitable for aggressive  
22    water applications as NIBCO advertised and asserted.  
23    It's failing in as little as one year after  
24    installation due to oxidative degradation.

25           Q     So your opinion is that the defect here that

1 was ultimately causing these leaks was all part of this  
2 front-end setup process?

3 **A Yes.**

4 Q Okay. We talked a little bit about how you  
5 define a failure. And I want to ask you a question  
6 about something different and see what you think it is.

7 So is it your opinion that the fact that  
8 something might fail at some point renders that product  
9 defective?

10 MR. EDWARDS: Object to the form.

11 THE WITNESS: I'm not sure I understand your  
12 question. Could you be more specific, please?

13 BY MR. KUHLMAN:

14 Q The fact that something is ultimately  
15 susceptible to a certain type of failure, does that  
16 make it defective in its design?

17 **A Not necessarily.**

18 Q Okay. You talked about a Pinto. So I'm  
19 going to ask you about a car question; right? So you  
20 would agree with me that any kind of mechanical  
21 component is ultimately going to fail; right?

22 **A Not necessarily.**

23 Q Okay. Would you agree with me that plumbing  
24 components at some point if they're used, they're  
25 ultimately probably going to fail?

1           **A     Eventually all materials will degrade, but it**  
2           **may take hundreds and hundreds of years for that to**  
3           **happen.**

4           Q     Okay. And the actual process that something  
5           undergoes where it's starting to degrade, does that  
6           itself equal failure even if it takes hundreds of years  
7           for it to happen?

8           MR. EDWARDS: Object to the form.

9           THE WITNESS: Define "failure" in your  
10          question.

11         BY MR. KUHLMAN:

12          Q     In your mind, if something is put into  
13          service and it starts the process of wearing down, if  
14          it's going to last for however long it's going to last,  
15          the fact that that process of wearing down has started,  
16          does that render the product defective?

17          **A     You're not giving me enough information to be**  
18          **able to answer that question in an accurate or**  
19          **meaningful way.**

20          Q     All right. So you have said a few times that  
21          you don't believe -- you don't believe NIBCO's tubing  
22          to be chlorine resistant. Have I heard that correctly?

23          **A     I believe that the tubing has not exhibited**  
24          **adequate resistance to oxidation during service**  
25          **particularly in the presence of chlorinated potable**



1 water but not exclusively in the presence of  
2 chlorinated water.

3 We also see evidence in the Medder residence  
4 of similar oxidative degradation in the pipe and  
5 similar craze cracking, albeit to a lesser degree, in  
6 the absence of chlorinated water. So chlorine is an  
7 exacerbating condition but clearly not a necessary  
8 condition.

9 Q And the Medder home, that's part of the Cole  
10 case; is that right?

11 A It is part of the Cole case, but it's exactly  
12 formulated in the same manner as the pipes that are at  
13 issue in this case. Therefore, we would not expect it  
14 to perform differently just because it's in a different  
15 house or associated with a different lawsuit.

16 Q Okay. Aside from yellow brass, can other  
17 widely used plumbing components corrode?

18 A You're going to need to be more specific in  
19 your question.

20 Q Okay. Can copper corrode?

21 A Copper can corrode under certain  
22 circumstances.

23 Q Is copper defective?

24 A I haven't been asked to evaluate something  
25 that's copper. You're going to have to be more

1       **specific in that.**

2           Q       I'm asking you now. Does the fact that  
3       copper can corrode render it to be defective for use in  
4       potable water applications?

5           MR. EDWARDS: Object to the form.

6           THE WITNESS: Again, you're giving me  
7       insufficient information to render any kind of  
8       meaningful answer at all.

9       BY MR. KUHLMAN:

10          Q       Is dezincification a type of corrosion?

11          **A       Dezincification is a type of corrosion, yes.**

12          Q       And is it your opinion that because these  
13       brass fittings with more than 15 percent zinc are  
14       vulnerable to dezincification that that renders them  
15       defective? That's your opinion; right?

16          MR. EDWARDS: Object to the form.

17          THE WITNESS: That is not exactly my opinion,  
18       no. That is one thing that we have looked at. We have  
19       looked at the alloy composition. We have looked at the  
20       failure mechanisms. But an important piece of that is  
21       that brass fittings are failing during service, as in  
22       snapping in two and allowing a large volume of release  
23       of water, in as little as two years after installation.  
24       That's a really important piece that must not be  
25       overlooked.

1           The dezincification that is occurring in  
2       these fittings is real. It's present. And that  
3       vulnerability has universally been demonstrated in  
4       every NIBCO brass fitting that we've looked at. And  
5       that observation is exactly what we would expect based  
6       upon published literature that commonly holds that all  
7       brass alloys with greater than 15 percent zinc are  
8       known to be vulnerable to stress corrosion cracking and  
9       dezincification corrosion in potable water  
10      environments.

11           Therefore, if you're making a plumbing  
12      fitting that is intended to be used in a potable water  
13      environment and it contains greater than 15 percent  
14      zinc, that was the expected outcome. Premature failure  
15      was the likely predicted expectable outcome based on  
16      what we know.

17      BY MR. KUHLMAN:

18           Q     Based on what you know, you told me that you  
19      can't determine when a yellow brass fitting is going to  
20      fail.

21           A     That's correct. What we do know is that they  
22      have failed repeatedly in less than seven years. I  
23      can't tell you for a specific fitting when it will  
24      fail. What I can tell you is that I have yet to see a  
25      NIBCO field returned brass fitting that did not show

1 evidence of the failure mechanism in process, which is  
2 exactly what we would expect for alloys containing  
3 greater than 15 percent zinc and that every NIBCO brass  
4 fitting out there that contains greater than 15 percent  
5 zinc has the inherent defect that renders it vulnerable  
6 to this failure mechanism -- these failure mechanisms.  
7 There are actually two of them.

8 Q As we talked about earlier, the fact that  
9 this failure mechanism is present in some degree  
10 doesn't tell you when the fitting is going to fail;  
11 right? We agree on that?

12 A It doesn't tell you when the fitting may  
13 leak. But the defect exists whether it leaks or not.  
14 That vulnerability is there.

15 Q So is copper vulnerable to corrosion in  
16 certain environments?

17 A Certainly.

18 Q Which ones?

19 A To be clear, I have not been asked to render  
20 opinions related to copper in this case. And NIBCO --

21 Q I'm asking you now.

22 A -- products are not made from copper. So  
23 yes, copper can corrode under certain circumstances.

24 Q And how quickly would it corrode in an  
25 aggressive environment?

1 MR. EDWARDS: Object to the form.

2 THE WITNESS: You're providing way too little  
3 information to provide any kind of a meaningful answer.  
4 What does "aggressive" mean to you?

5 BY MR. KUHLMAN:

6 Q What type of water chemistry would be the  
7 most aggressive to copper?

8 A There are a variety of water chemistries that  
9 can be aggressive to copper in different ways --

10 Q Such as?

11 A -- so you will have to be specific in your  
12 question.

13 Q So which type of water environment would be  
14 most likely to cause some type of corrosion in copper?

15 A The type of water chemistry that would  
16 contribute to corrosion would depend upon what  
17 corrosion mechanism we're talking about. Which  
18 corrosion mechanism are you asking me about?

19 Q Are there any corrosion mechanisms that can  
20 occur in copper that would result in it leaking?

21 A Yes. And not all of them relate to water.  
22 So what corrosion mechanism are you referring to?

23 Q What type of environment could copper be  
24 placed in where it may develop a leak because of  
25 corrosion? Would there be something specific that you

1 would be looking for if you were investigating a copper  
2 failure?

3 **A There are a variety of corrosion mechanisms**  
4 **that may occur in copper. You have to be more specific**  
5 **in your question for me to be able to answer that.**

6 Q If copper is used in one of these  
7 environments where there is the potential for a  
8 failure, is that copper defective because it's starting  
9 to show signs of corrosion?

10 MR. EDWARDS: Objection.

11 THE WITNESS: What environment? What alloy?  
12 What stress? You're giving me way too little  
13 information to give you any kind of meaningful answer.  
14 You can't -- you can't ask an ill-defined question and  
15 expect me to give you any kind of meaningful answer.  
16 What are you asking me?

17 BY MR. KUHLMAN:

18 Q Is any amount of corrosion okay in a copper  
19 component?

20 **A Under what circumstances? In what**  
21 **application?**

22 Q In a potable water application. For a  
23 potable water application, if the copper piping is at  
24 somebody's house and it's starting to corrode in some  
25 fashion, is that ever okay?

1 MR. EDWARDS: Object to the form.

2 THE WITNESS: I have no idea. Give me the  
3 full scope of the scenario.

4 BY MR. KUHLMAN:

5 Q That's the scenario. Copper is installed in  
6 someone's house and it's starting to corrode. It  
7 hasn't failed but it's starting to corrode. Is that  
8 copper defective?

9 MR. EDWARDS: Same objection.

10 THE WITNESS: I can't answer that question  
11 with the information you've given me. I'm sorry.

12 BY MR. KUHLMAN:

13 Q What additional information would you need to  
14 answer that question?

15 A Everything. Define the application. Define  
16 what you mean by "failure." Define what copper alloy  
17 you're talking about. Where was the corrosion? Was it  
18 at the outside? Was it at the inside? Were there  
19 other metals involved in the system? What was the  
20 water chemistry? What's the oxygen concentration?  
21 What's the relevance?

22 We've not investigated copper failures.  
23 They're not at issue in this case. We've not  
24 investigated them in any way. I've not rendered any  
25 opinions about any kind of copper failure and I'm not

1       comfortable trying to render any kind of an opinion  
2       based upon some ill-defined hypothetical condition that  
3       doesn't give me any adequate information.

4           Q       So if you're going to assess a zinc fitting  
5       that's used in a potable water application, you would  
6       need to look at a lot of these factors to determine  
7       what was causing a problem with the fitting, would you  
8       not?

9                   MR. EDWARDS:   Objection.

10          BY MR. KUHLMAN:

11           Q       You'd have to look at the water chemistry.  
12       You'd have to look at the flow rates for that  
13       particular fitting. You'd want to look to see if it's  
14       close to the water heater. You'd want to look to see  
15       how the corrosion was showing up. You'd want to look  
16       at the crimp on the fitting, maybe stresses on the  
17       fitting. Wouldn't you want to look at all those things  
18       to determine what was causing the particular issue with  
19       the fitting?

20                   MR. EDWARDS:   Object to that question as  
21       multiply compound in nature.

22                   THE WITNESS:   Would you please clarify your  
23       question and ask that in smaller pieces? Break that  
24       down in a format that I could actually respond to it.

25                   MR. KUHLMAN:   I disagree. I think the



1 question's fine. Can we read it back and answer it if  
2 you can?

3 (Record read as requested.)

4 MR. EDWARDS: Same objection as to form.

5 THE WITNESS: That is a mind-bogglingly  
6 complicated question. I will answer it in this way  
7 since you are insisting upon an answer. Copper  
8 corrosion is not exactly like zinc corrosion with  
9 respect to potable water applications. They experience  
10 different failure mechanisms. Copper cannot dezincify.  
11 It is not vulnerable to dezincification corrosion. It  
12 does not experience stress corrosion cracking in the  
13 same way and due to the same reasons as brass could  
14 experience stress corrosion cracking, first of all.

15 Secondly, the dezincification issue in brass  
16 fittings has been studied and documented extensively in  
17 published literature already as has stress corrosion  
18 cracking and brass plumbing fittings in particular in a  
19 variety of water chemistries, under a variety of water  
20 temperature conditions, under a variety of stress  
21 applications, and a variety of manufacturing  
22 conditions.

23 We know not only how the material responds.  
24 We know how microstructure affects that. We know how  
25 trace metal constituents affect that. We do know how

1 water chemistry affects that. We know how temperature  
2 affects that. We know how the oxygen concentration in  
3 the water affects that. We know how any  
4 installation-related stresses might or might not affect  
5 that. All of that is already known for brass plumbing  
6 fittings and well established in the industry.

7 That being said, in these cases, we have  
8 looked at those things. We have looked at the manner  
9 of installation. We have looked at proximity to the  
10 water heater. We have looked at the water chemistry  
11 and the degree of oxidation and the pH and the  
12 temperature. We have looked at the microstructure of  
13 these materials and the composition of these materials.  
14 And all of those results were 100 percent consistent  
15 with what we expected to see going into the analysis  
16 based upon what has already been investigated ad  
17 nauseam within the body of published literature.

18 So in this case, we know within a reasonable  
19 degree of scientific certainty that those fittings are  
20 failing in very short order due to dezincification  
21 corrosion and stress corrosion cracking. And we know  
22 that those mechanisms could not have occurred if they  
23 had made those fittings out of plastic instead. And we  
24 know that they almost certainly would not have occurred  
25 in these potable water environments had they been made

1 from a brass alloy that contained less than 15 percent  
2 zinc.

3 We also know that there was nothing unusual  
4 about the water that would have caused these failure  
5 mechanisms. We know there was nothing unusual about  
6 the manner of installation or the proximity to the  
7 water heater or any of the other conditions that you  
8 have cited that would have caused these failure  
9 mechanisms when they wouldn't have occurred otherwise.

10 Does that answer your question?

11 BY MR. KUHLMAN:

12 Q Sure. And if you were going to --

13 A Thank you.

14 Q -- assess other failures that you've never  
15 seen before, you would want to look at some of these  
16 factors to determine what caused the problem, would you  
17 not?

18 MR. EDWARDS: Object to the form.

19 THE WITNESS: What problem are you referring  
20 to?

21 BY MR. KUHLMAN:

22 Q Well, first, if someone is claiming a fitting  
23 failure, you would want to look and see if there was  
24 evidence of dezincification, would you not?

25 MR. EDWARDS: Object to the form.

1 THE WITNESS: I would not need to look to  
2 know that that fitting exhibits the same defective  
3 vulnerability to dezincification corrosion and stress  
4 corrosion cracking.

5 BY MR. KUHLMAN:

6 Q So whether it has it or not, it's vulnerable  
7 to it, and in your mind that makes it a problem.

8 MR. EDWARDS: Object to the form.

9 THE WITNESS: The defective design exists  
10 whether it leaks or doesn't leak or whether it leaks  
11 first due to some other reason. That same  
12 vulnerability to dezincification corrosion and stress  
13 corrosion cracking will exist in every NIBCO fitting  
14 that contains greater than 15 percent zinc.

15 BY MR. KUHLMAN:

16 Q Is there any plumbing material that can't  
17 fail?

18 MR. EDWARDS: Object to the form.

19 THE WITNESS: You'll have to define what you  
20 mean by "failure."

21 BY MR. KUHLMAN:

22 Q Break in some fashion that results in water  
23 exiting the system.

24 A Sure. There are components that won't break  
25 perhaps.

1           Q     Are there any components that won't  
2           ultimately break down in such a way that water might  
3           exit a system?

4           A     As we've said before, given sufficient time,  
5           which may be hundreds of years, eventually all  
6           materials will alter their state or arguably degrade in  
7           some manner. The question is how long does that take  
8           and whether or not that matters in any way. If  
9           something takes 250 to 300 years for it to begin to  
10          show any detectable sign of degradation, that's  
11          probably a pretty good run for a component of any kind.  
12          The NIBCO products, however, have not done that.

13          Q     And for the Meadow houses, none of the  
14          fittings have actually failed in such a way that there  
15          was a catastrophic leak or water dripping on the walls.

16                   Is that fair?

17          A     Susan Plisko did report that she had had a  
18          fitting failure. I believe she indicated that she  
19          thought that it was in plastic and not brass. I don't  
20          think we know that with certainty. That fitting has  
21          not been made available to me for inspection. We are  
22          not aware of any brass fitting that is alleged to have  
23          caused a detected leak in any of these houses.

24          Q     Can you assess the cause of a failure when  
25          you don't have access to the component that failed?

1 MR. EDWARDS: Object to the form.

2 THE WITNESS: I don't understand your  
3 question. In some cases perhaps.

4 BY MR. KUHLMAN:

5 Q How?

6 A What do you mean "how"?

7 Q How would you assess what caused a fitting to  
8 fail if you're never provided access to the fitting?

9 A I don't think your earlier question was  
10 specific to a fitting.

11 Q I'm asking you a different question.

12 A But I might ask you some questions about that  
13 failure. And dependent upon your answers, I might be  
14 able to give you a reasonable conclusion for why that  
15 failed.

16 Q So for you as an expert to determine what  
17 caused a failure in a fitting, you need to know more  
18 than it's a fitting. Is that fair?

19 MR. EDWARDS: Object to the form.

20 THE WITNESS: Please ask me a specific  
21 question. I'll be happy to try to answer it. I feel  
22 like you're --

23 BY MR. KUHLMAN:

24 Q Let me ask you this: If someone says, "I've  
25 got a NIBCO fitting and it failed," could you sit there

1 on the phone in response to that question to a  
2 reasonable degree of scientific certainty and say, "I  
3 know why it failed" and provide a specific, reliable  
4 response to that question?

5 MR. EDWARDS: Object to the form.

6 THE WITNESS: I would begin by asking you  
7 what you mean when you say it failed. So if you would  
8 like to answer that and give me more information, we  
9 can explore that.

10 BY MR. KUHLMAN:

11 Q So you would need to explore the details of  
12 the situation for that fitting. Fair?

13 MR. EDWARDS: Object to the form.

14 THE WITNESS: If you want to ask me why my  
15 fitting failed and you give me no other information,  
16 then I would probably ask you some follow-on questions.  
17 If you instead said to me, "I have a NIBCO 1006 insert  
18 brass fitting that's made from a high zinc brass, is  
19 that fitting going to perform as I expect it to in my  
20 potable water application?" I would feel very  
21 comfortable telling you no based upon what we know.  
22 Those are very different questions.

23 MR. KUHLMAN: Why don't we break for lunch?

24 MR. EDWARDS: Okay.

25 (Off the record 12:41 p.m. to 1:51 p.m.)

1 (Exhibit 6 Marked for Identification.)

2 BY MR. KUHLMAN:

3 Q We're back on the record after a short lunch  
4 break. And, Ms. Smith, I'm going to hand you a  
5 document that we'll go ahead and mark as Exhibit 6.

6 Ms. Smith, have you seen this document  
7 before?

8 **A I believe so.**

9 Q I'll represent to you that this was copied in  
10 your file for this matter. And is it your  
11 understanding that NIBCO offered either a 25-year  
12 warranty or a 10-year warranty on the PEX products at  
13 issue in this case depending on certain  
14 installation-related issues?

15 **A It's my understanding that they offered a**  
16 **25-year warranty if all NIBCO products were used in the**  
17 **system and a 10-year warranty if components from other**  
18 **manufacturers were used in the system.**

19 Q So if NIBCO components were installed in 2006  
20 and they're still functioning properly and they're  
21 mixed in with components from other systems, would  
22 NIBCO have satisfied its warranty obligations at this  
23 point as far as you're concerned?

24 MR. EDWARDS: Object to the form of the  
25 question. Calls for a legal conclusion.



1 THE WITNESS: I don't believe I have the  
2 information I would need to make that determination in  
3 and of itself just looking at this warranty.

4 BY MR. KUHLMAN:

5 Q Okay. And I'd like to direct your attention  
6 to the first section that appears to be a little bit  
7 more bold and it's in all caps. It's the third  
8 paragraph down. And it says "In order for this limited  
9 warranty to apply, the above-referenced products must  
10 be installed by a licensed professional plumber in  
11 accordance with NIBCO installation instructions and in  
12 compliance with all applicable code requirements.  
13 Failure to do so will void all applicable warranties."

14 Did I read that correctly?

15 **A You did read that correctly.**

16 Q Okay. And do you believe that it's important  
17 for PEX products to be installed in compliance with  
18 applicable code requirements?

19 MR. EDWARDS: Object to the form. And it's  
20 asked and answered.

21 THE WITNESS: Important in what respect?

22 BY MR. KUHLMAN:

23 Q Do you believe that it's important for the  
24 overall health of a plumbing system that it be  
25 installed in a manner consistent with the applicable

1 code requirements?

2 MR. EDWARDS: Same objection.

3 THE WITNESS: Not necessarily. It depends on  
4 what aspect of the health of the plumbing system you're  
5 referring to.

6 BY MR. KUHLMAN:

7 Q Okay. Do you think that a plumbing system  
8 that fails to meet code with respect to excessive  
9 pressure could fail sooner than one that complies with  
10 the code?

11 A By what mechanism?

12 Q As a result of excessive pressure causing  
13 cracks in PEX tubing.

14 A What types of cracks? You've got to give  
15 more information for that. Certainly excessive  
16 pressure isn't going to cause, for example,  
17 dezincification corrosion. You're asking some  
18 open-ended questions. With respect to tubing, can you  
19 make it more specific, please?

20 Q Sure. With respect to -- hold on. Okay.  
21 When you were conducting your failure analyses at the  
22 Meadow homes with respect to these PEX products at  
23 issue, did you evaluate the water pressure?

24 A I did not conduct any failure analyses at the  
25 Meadow home. We conducted a site inspection of the

1 plumbing installation and together with NIBCO's  
2 experts, ESI, we evaluated water pressure.

3 Q Okay. And I was referring to the Meadow  
4 homes in general, all three of them. During your site  
5 inspections, did you take a reading for the water  
6 pressure at the house?

7 A With ESI. We used their gauge and ESI was  
8 the one who put it on. But we together were observing  
9 that measurement and recording it.

10 Q And why did you evaluate the pressures in the  
11 system at the Meadow homes when you performed the site  
12 inspection?

13 A Because we wanted to know what the pressure  
14 was.

15 Q Okay. From a pipe perspective, if the system  
16 is allowed to remain with elevated pressure for any  
17 appreciable amount of time, a significant amount of  
18 damage would occur to the pipe, would it not?

19 A Not necessarily.

20 Q Why not?

21 A Depends on the magnitude of the pressure and  
22 a number of other conditions.

23 Q Okay. But with respect to the NIBCO tubing,  
24 if a system is allowed to remain at an elevated  
25 pressure around a hundred PSI for any appreciable

1 amount of time, could that cause cracks and damage to  
2 the tubing?

3 MR. EDWARDS: Object to the form as to  
4 "appreciable time."

5 THE WITNESS: What type of cracks are you  
6 referring to?

7 BY MR. KUHLMAN:

8 Q Could cracks initiate in the wall of the  
9 tubing?

10 A By what mechanism? That's an important  
11 distinction. If you're asking me if creep rupture  
12 cracks can form in insufficiently cross-linked NIBCO  
13 PEX tubing over time exposed to static pressure,  
14 hydrostatic pressure, the answer would be eventually  
15 that could happen. I don't know at what magnitude of  
16 pressure that would necessarily happen.

17 However, that is not the failure mechanism  
18 that we have observed in the initiation region for the  
19 incident fractures. These fractures have initiated by  
20 a different mechanism that is far less dependent upon  
21 pressure. So you need to be specific, please, in the  
22 question you're asking.

23 Q And what was the crack mechanism that you  
24 claimed to have observed in these houses?

25 A Oxidative degradation.

1           Q     Are there other potential crack mechanisms  
2           that you've observed in PEX tubing aside from creep  
3           rupture cracks and oxidative degradation?

4                     MR. EDWARDS: Object to the form.

5                     THE WITNESS: Not in NIBCO PEX tubing.

6           BY MR. KUHLMAN:

7           Q     Okay. What about other PEX tubing?

8           A     **In other PEX tubing, I have seen different**  
9           **crack mechanisms.**

10          Q     Such as?

11          A     **I have seen UV exposure cause cracks, for**  
12          **example, in field returned samples that were submitted**  
13          **for UV exposure testing.**

14          Q     Okay. Any others?

15          A     **Not as I recall as we sit here today.**

16          Q     Okay. So let's talk specifically about creep  
17          rupture testing. Would -- if NIBCO 1006 PEX pipe is  
18          allowed to remain at a hundred PSI for any appreciable  
19          amount of time, would that be sufficient to initiate  
20          creep rupture cracks in the system, in the tubing?

21                     MR. EDWARDS: Object to the form.

22                     THE WITNESS: I was not asked to evaluate  
23          that in this case.

24          BY MR. KUHLMAN:

25          Q     I'm asking you right now.

1           A     And I'm telling you I have insufficient  
2     information to answer that. I have not evaluated that  
3     in this case.

4           Q     You've analyzed the NIBCO tubing before;  
5     right?

6           A     I've analyzed certain aspects of the NIBCO  
7     tubing but I've not analyzed all aspects of the NIBCO  
8     tubing. I've only analyzed aspects that I believe to  
9     be relevant to the cause of failure that's at issue in  
10    this case.

11          Q     Is it your position that NIBCO 1006 PEX  
12    tubing cannot fail as a result of creep rupture  
13    cracking without the presence of oxidative degradation?

14          A     I don't believe I have asserted that opinion  
15    anywhere, no.

16          Q     So is that an opinion that you hold?

17          A     Under some circumstances I'm sure that that  
18    could happen. I don't know at what pressure that would  
19    happen or at what level of cross-linking that would  
20    happen or under what specific circumstances it would  
21    happen, but certainly it's possible. Anything is  
22    possible.

23          Q     Okay. In NIBCO 1006 PEX pipe, can high  
24    pressure in a pipe result in the initiation of a crack?

25               MR. EDWARDS: Object to the form.

1 THE WITNESS: I'm sorry. Could you ask  
2 again, please?

3 BY MR. KUHLMAN:

4 Q In the NIBCO 1006 tubing, can high pressure  
5 in the pipe result in the initiation of a crack?

6 A Are you asking if it can or if it did?

7 Q If it can.

8 A Again, in theory, anything is possible under  
9 certain circumstances that I can't even begin to define  
10 as we sit here today. It's probably possible.

11 Q And that could happen --

12 A And we do know within a reasonable degree of  
13 scientific certainty that that is not what happened  
14 with the incident pipes that are at issue in this case.

15 Q If you bring the pressure down in a system  
16 after it has been at an elevated pressure, would it  
17 essentially heal the damage to the pipe or is it  
18 something where once the damage is done, it's done?

19 MR. EDWARDS: Object to the form.

20 THE WITNESS: What type of damage are you  
21 referring to when you say "damage"?

22 BY MR. KUHLMAN:

23 Q If you have a system operating a NIBCO 1006  
24 pipe system and it's operating at elevated pressures,  
25 upwards of a hundred PSI and you install a PRV after

1       that's been in place and the system pressure comes  
2       down, will the tubing heal itself, or if there are  
3       cracks that have already started, will they continue to  
4       propagate?

5                   MR. EDWARDS:   Same objection.

6                   THE WITNESS:   You're asking a different  
7       question from what you asked a moment ago.   If cracks  
8       are present due to any mechanism, whether they  
9       initiated due to oxidative degradation or whether they  
10      initiated due to creep rupture or any other condition,  
11      they would be expected to grow at some rate if  
12      subjected to any hydrostatic stress that is sufficient  
13      to propagate the crack.   So as long as the level of  
14      stress at the crack tip remains sufficiently high with  
15      whatever pressure you achieved after installing a PRV,  
16      that crack would continue to grow.

17                   Does that answer your question?

18       BY MR. KUHLMAN:

19               Q       At what pressure in a chlorinated water  
20       system using NIBCO 1006 pipe would you expect for there  
21       to be a ductile creep rupture crack before there would  
22       be evidence of oxidative degradation?

23               A       **I don't understand your question.**

24               Q       With NIBCO's 1006 PEX piping, how high would  
25       the pressure need to be in a system for there to be a



1 failure of the tubing, cracks, that initiate and go all  
2 the way through the wall --

3 MR. EDWARDS: Object to the form.

4 BY MR. KUHLMAN:

5 Q -- without the evidence of oxidative  
6 degradation?

7 A I don't believe I have ever yet seen a NIBCO  
8 pipe that has been in service that didn't have evidence  
9 of oxidative degradation. And so I don't know that  
10 there is an answer to that question.

11 Q If a pipe is being operated in a chlorinated  
12 water situation without a PRV and it's in excess of  
13 80 PSI, can that cause any kind of damage to the  
14 tubing?

15 A How far in excess of 80 PSI?

16 Q Ninety.

17 A I have no idea as we sit here what level of  
18 damage because it would depend upon the molecular  
19 weight that they chose for that material and a number  
20 of other factors.

21 What we do know with certainty is that the  
22 cracks that have been at issue in this case did not  
23 form due to creep rupture, due to pressure alone. They  
24 all exhibit evidence of crazing and oxidative  
25 degradation at the interior surface of the pipe in a

1       **very distinctive, well-defined initiation region that**  
2       **is distinctly different from the creep rupture**  
3       **morphology that we see at the outer edge of the**  
4       **fracture.**

5           Q       So as far as you've seen, you've not been  
6       able to analyze all incident pipe and some has been  
7       discarded. Is that fair?

8           MR. EDWARDS: Object to the form.

9           THE WITNESS: I don't know that that is a  
10      fair response. We did not see incident pipes from the  
11      Boyd residence. We have certainly looked at many, many  
12      incident pipes from this case and a number of other  
13      cases. In fact, I have personally inspected upwards of  
14      a thousand incident pipes that have leaked during  
15      service, and they have all exhibited tremendous  
16      uniformity and very, very similar characteristics with  
17      regard to the manifestation of the defect that exists  
18      in these pipes and the cracks that have resulted from  
19      that process. They've been strikingly similar to the  
20      point that, if we were to lay out photos, I don't  
21      believe any of us would know which home they came from  
22      if they were not specifically identified.

23               And so I would think it quite reasonable to  
24      conclude that other pipes that have failed in the same  
25      manner from the Boyd residence in a similar time frame

1 with the same formulation that were reported to also  
2 have linear cracks in them would not exhibit something  
3 distinctly different. And then truth be told, whether  
4 they did or they didn't, the underlying defects still  
5 existed in those pipes. We know that because it's  
6 formulation and manufacturing-process specific.

7 BY MR. KUHLMAN:

8 Q NIBCO tubing can fail for reasons completely  
9 aside from the formulation of the tubing, can it not?

10 A It can.

11 Q And what are some of the different ways --  
12 some of the different things that can cause PEX  
13 failures?

14 A Please define what you mean by a "failure."

15 Q Well, if the PEX freezes -- if the water  
16 inside PEX freezes, that can cause damage to the  
17 tubing, can it not?

18 A Again, define what you mean by "damage."

19 Q How would you assess the condition of a piece  
20 of NIBCO PEX tubing if it had been frozen?

21 A It would typically deform in a characteristic  
22 manner that would be very distinctive for a freeze  
23 failure.

24 Q Okay. And that can happen to NIBCO PEX  
25 tubing; right?

1           **A     Yes.**

2           Q     And does that weaken the tube if it's  
3     deformed like that or does that make it stronger?

4           **A     It can weaken it. It won't make it stronger.**  
5     **It could also have no appreciable effect on it**  
6     **depending upon the degree of freeze and the degree of**  
7     **expansion.**

8           Q     And if it deforms in such a way that it  
9     weakens the tubing, that can result in a failure.  
10    Fair?

11          **A     If the freeze or the ice dam inside the pipe**  
12    **or the pressure inside the pipe is sufficient, it can**  
13    **result in a rupture through the wall of the tubing.**

14          Q     And mechanical damage can cause a failure in  
15    NIBCO PEX tubing. Fair?

16          **A     You'll have to be more specific. When you**  
17    **say "mechanical damage," what do you mean?**

18          Q     Someone accidentally hits the tubing with a  
19    hammer as they're installing it.

20          **A     Hitting it with a hammer should not**  
21    **appreciably affect the tubing.**

22          Q     How about a nail?

23          **A     A nail can penetrate the wall of the tubing.**

24          Q     And that can cause a failure in the tubing?

25          **A     Again, "failure of the tubing" is a**

1        **subjective term. It can cause a through-wall leak path**  
2        **in the tubing over time.**

3            Q        Insects can cause through-wall leaks in NIBCO  
4        PEX tubing, can they not?

5            A        **Certain insects can. Not all.**

6            Q        If a pipe is compressed, that can result in a  
7        through-wall crack in the NIBCO PEX tubing.

8                    Is that fair?

9            A        **Compressed in what manner and to what extent?**

10          Q        It can be compressed to an extent sufficient  
11        to cause a weakness in the tubing that might result in  
12        a crack initiating and propagating through the wall.

13                    Is that fair?

14          A        **Again, in theory, anything is possible. It**  
15        **would take a high level of compression to cause**  
16        **appreciable damage. And the tubing is advertised as**  
17        **being resistant to certainly light surface damage and**  
18        **compression.**

19          Q        If someone steps on the tubing on accident --  
20        someone, say, my size steps on the tubing and then  
21        installs it, would you expect that to be a sufficient  
22        compression to cause a weak spot in that tubing?

23          A        **I would not, based on my experience.**

24          Q        Can excessive bends result in cracks forming  
25        in the tubing?

1           **A     Excessive bends can result in localized**  
2           **stress concentrations that can promote creep rupture in**  
3           **the tubing.**

4           Q     And that can cause a through-wall crack that  
5           results in a leak. Fair?

6           **A     It can over time.**

7           Q     And then oxidative degradation can cause a  
8           crack to form in NIBCO tubing and result in a  
9           through-wall crack, can it not?

10          **A     Clearly can and has in many instances.**

11          Q     What are some of the potential causes of  
12          oxidative degradation?

13          **A     Insufficient stabilization of the PEX**  
14          **material and an insufficiently designed manufacturing**  
15          **process.**

16          Q     Can UV exposure cause oxidative degradation  
17          in NIBCO's PEX tubing?

18          **A     Not of the type that we observed in this**  
19          **case. It can cause oxidative degradation, but it would**  
20          **not manifest in the manner that it has in this case.**

21          Q     Can excessive temperatures result in  
22          oxidative degradation of NIBCO's PEX tubing?

23          **A     Excessive temperature can accelerate the**  
24          **oxidation of PEX. Again, we have found no evidence**  
25          **that that, in fact, did occur in this case to any**

1       **appreciable extent.**

2           Q       How high would a temperature need to be for  
3       there to be an increase in the rate of oxidation of  
4       NIBCO PEX tubing?

5           MR. EDWARDS:   Object to the form.

6           THE WITNESS:   There is no set answer to that.  
7       Could you be more specific, please?

8       BY MR. KUHLMAN:

9           Q       Well, if you increase the temperature from,  
10       let's say, 140 degrees to 150 degrees and the system is  
11       operating at 80 PSI, would you expect that to result in  
12       any type of acceleration for oxidative degradation in  
13       NIBCO PEX tubing?

14           A       **Relative to what?**

15           Q       Relative to a piece of tubing that's  
16       operating within the temperature specification for the  
17       tubing.   So 80 and 140 for chlorinated water versus 80  
18       and 150 in chlorinated water.

19           A       If you're comparing 140 and 150, there can be  
20       some slight effect from that.   Calculations that were  
21       performed by NIBCO's experts in this case represented  
22       that, if a temperature in a system, all other things  
23       being equal, were 160 degrees instead of 140 degrees,  
24       that the anticipated life for well-made,  
25       well-stabilized PEX would go from 50 years to 22 years.

1           Q     Can transition metal oxides in the water  
2     result in oxidative degradation of NIBCO's 1006 PEX  
3     tubing?

4           A     Insufficient -- I'm sorry. Metal oxides can  
5     promote autocatalytic oxidation in a material that is  
6     vulnerable to oxidation. But you have to have material  
7     that is sufficiently vulnerable to start with for that  
8     to occur. The same is true for all of these effects.

9                     NIBCO PEX pipe is to be designed to withstand  
10    the anticipated service environment. And transition  
11    metal oxides are certainly an anticipated part of a  
12    plumbing system and they're seen fairly frequently. So  
13    the pipe would need to be insufficiently stabilized for  
14    that to play a significant role generally.

15          Q     Now, we've talked about a number of different  
16    ways that NIBCO's 1006 PEX tubing could crack with or  
17    without oxidative degradation being present. Is there  
18    any way for the untrained eye to know the reason why  
19    the crack in their pipe formed?

20                   MR. EDWARDS: Object to the form.

21                   THE WITNESS: Could you ask that again,  
22    please? I'm trying to make sure I understand you.

23                   MR. KUHLMAN: Could you just read it back?

24                             (Record read as requested.)

25                   THE WITNESS: Define what you mean by



1 "untrained." Untrained relative to what?

2 BY MR. KUHLMAN:

3 Q Is there any way for a consumer who's looking  
4 at a failure of their NIBCO 1006 PEX pipe to determine  
5 why the crack in their pipe formed just looking at it?

6 A In my experience, I don't know that there's a  
7 set answer to that question. I have encountered some  
8 consumers who were trained and skilled in any number of  
9 issues related to engineering and materials who would  
10 be able to determine that. And I have met other  
11 consumers who, you know, looked at something that I  
12 would think that would be obvious that they were not  
13 able to interpret. I don't know that there's a set  
14 answer to that question.

15 Q Well, if you hadn't conducted all the  
16 research that you conducted and reviewed all the test  
17 reports that you've conducted, if you'd just looked at  
18 a piece of pipe that had failed, would you be able to  
19 determine what caused the failure without doing more?

20 MR. EDWARDS: Object to the form.

21 THE WITNESS: It would depend upon what the  
22 failure mechanism is and what the characteristics of  
23 that are. You know, certainly if you bring me a NIBCO  
24 brass fitting and it's filled with white crusty  
25 deposits adhering to the interior surface of the

1 fitting and it's plugged with those deposits, yeah, I'm  
2 going to pretty much know right off the bat that that's  
3 probably dezincification.

4 BY MR. KUHLMAN:

5 Q And if you're looking at a piece of 1006 PEX  
6 tubing, can you determine the cause of the failure  
7 without doing more than just looking at it with your  
8 eye?

9 MR. EDWARDS: Object to the form.

10 THE WITNESS: I can at this point with regard  
11 to this failure mechanism because it's been studied  
12 exhaustively and extensively and we understand it fully  
13 and we know now what the underlying mechanism is. So  
14 when we see longitudinal brittle slits in the pipe wall  
15 initiating at the interior surface of the pipe, we can  
16 have reasonable confidence, if it's a 1006 formulation,  
17 that's going to tie back to the defects in the  
18 formulation for the product. That product we know was  
19 inherently insufficiently stabilized going into the  
20 process.

21 Furthermore, the cause of the leak -- you  
22 seem to be confusing failure mechanism with root cause.  
23 And we need to be very careful about that distinction.  
24 You're asking me, I believe, if I can determine the  
25 failure mechanism.

1 BY MR. KUHLMAN:

2 Q Well, I think I want to ask you the other  
3 way. If you're just looking at a piece of NIBCO 1006  
4 PEX tubing that has a failure in it, can you determine  
5 just by looking at it with your eye what the root cause  
6 of that failure was?

7 A I can determine it looking just simply at the  
8 labeling on the pipe that it is insufficiently  
9 stabilized for the intended application. I can look at  
10 the 1006 rating knowing what I know today and know that  
11 that pipe is inherently defective for that application.  
12 That, I know.

13 Q But that wasn't my question. My question was  
14 can you --

15 MR. EDWARDS: Please let her finish her  
16 answer, Kevin.

17 BY MR. KUHLMAN:

18 Q My question was can you determine the root  
19 cause of the failure?

20 A In that case, yes. I would know that the  
21 root cause is the insufficient stabilization of the  
22 pipe if I'm seeing oxidative cracking, brittle  
23 cracking, through-wall cracking of that type. All of  
24 the different factors that you have mentioned, be it  
25 transition metal oxides, be it creep rupture, all of

1       those things are going to be secondary to oxidative  
2       degradation occurring in that material. And whether or  
3       not the leak ever manifests in the pipe, that defective  
4       condition still exists as a root cause in the NIBCO  
5       pipe.

6                   If you're asking me the cause of a leak,  
7       that's a different question from the underlying defect.  
8       I'm not sure we're on the same page here with what  
9       you're asking. If there's a nail hole in the pipe, I  
10      can tell you that just by looking at it, yes. Is that  
11      what you're asking me?

12           Q       That's something that you wouldn't hold NIBCO  
13      responsible for. Is that fair?

14                   MR. EDWARDS: Object to the form.

15                   THE WITNESS: I don't hold or not hold NIBCO  
16      responsible for any of these. I have been asked to  
17      render an opinion regarding the root cause of failure.  
18      That is my role. My role is technical.

19      BY MR. KUHLMAN:

20           Q       And we've talked about different causes of  
21      oxidative degradation. If you're just looking at the  
22      tubing, how do you rule out the various other ways that  
23      tubing can suffer from oxidative degradation like UV  
24      exposure, high temperatures, transition metal oxides?  
25      How do you rule those out?

1           A     We have ruled them out for the types of  
2     failures that are at issue in this case through the  
3     testing that has been performed to date in various  
4     cases and looking at the consistent results. We have  
5     considered those. We have used, for example, energy  
6     dispersive x-ray spectroscopy to look for evidence of  
7     transition metal oxides of the interior surface coupled  
8     with stereomicroscopy and scanning electron microscopy.  
9     We've ruled that out as a contributing factor. We've  
10    ruled it out in multiple instances, multiple potable  
11    water systems, multiple incident pipes. The same is  
12    true for creep rupture. We've ruled that out as an  
13    initiating mechanism by examining the fracture  
14    surfaces.

15               Now that all of that work has been done, we  
16    know that none of those are common to these failures  
17    that are occurring in the NIBCO pipe. And we know that  
18    none of those factors caused the pipe to be  
19    insufficiently stabilized and vulnerable to oxidation.  
20    That is a result of the design and manufacturing  
21    process for the pipe. These other conditions may  
22    exacerbate the failures but they do not cause them.

23           Q     So is it your position that elevated pressure  
24    in a NIBCO 1006 piping pressure that's above the  
25    plumbing code requirement for chlorinated water that

1       that cannot cause cracks to initiate?

2               **A     That is not my position. If you ramp the**  
3       **pressure up to 8- or 900 PSI, it will burst.**

4               Q     Well, what about 90 or a hundred PSI? Could  
5       that cause the tubing to fail before oxidative  
6       degradation becomes an issue?

7               **A     Experience has taught, no, that it would not.**

8               Q     Have you examined any homes where you  
9       believed that the failures in NIBCO 1006 tubing were  
10      the result of excessive pressures in the system and not  
11      oxidative degradation?

12              **A     Ask that again, please.**

13              Q     Have you analyzed any homes where you  
14      concluded that the failure in the NIBCO 1006 piping  
15      system was a result of excessive pressure in the system  
16      and not oxidative degradation?

17              **A     Yes.**

18              Q     Okay. When was that?

19              **A     In the Molony case.**

20              Q     Okay. And who retained you in the Molony  
21      case?

22              **A     I don't remember the gentleman's name.**

23              Q     Were you testifying for the plaintiff or the  
24      defendant?

25              **A     I believe it was for the plaintiff. Again,**

1       those are not things that stick for me because my  
2       answers don't depend upon who I'm representing. They  
3       depend upon the facts in the case.

4           Q     Okay. And what were the facts in the Molony  
5       case as best you can recall?

6           A     It's been a long time since I dealt with the  
7       Molony case. But as I recall, there was clear evidence  
8       of excessive pressure in the system as documented by  
9       pressure monitoring. There were some very unique  
10      installation conditions involving three separate water  
11      heaters, and we saw very distinctive ductile rupture  
12      failures in the piping from those homes.

13          Q     And was it your opinion that those failures  
14      were caused by the design of the NIBCO tubing?

15          A     No.

16          Q     And so under the right circumstances, in a  
17      normal homeowner's house, there could be a scenario or  
18      a setup for a plumbing system where failures in NIBCO  
19      1006 tubing can occur that fall outside the design  
20      issues and manufacturing issues of the tubing that  
21      we've talked about. Fair?

22               MR. EDWARDS: Object to the form. And asked  
23      and answered.

24               THE WITNESS: The tubing in the Molony case  
25      also showed evidence of oxidative degradation. The

1 same underlying defect existed in that pipe. And we  
2 were seeing evidence of that in that pipe. However,  
3 the thing that was different in that case was that it  
4 did not reflect what most would consider a normal  
5 plumbing application. The pressures were very, very  
6 high as evidenced by the failures themselves and  
7 through pressure monitoring, though I don't know to  
8 what degree. And we also, in that case, saw the  
9 pressure being the predominating mechanism for  
10 propagation through the wall.

11 BY MR. KUHLMAN:

12 Q Would you be surprised if your report in that  
13 case indicated that the pressure readings were at  
14 100 PSI in that system?

15 A I don't believe that is what my report  
16 stated. But if you have a copy, I'd be happy to review  
17 it with you.

18 Q Okay. We'll get to that in a little bit.  
19 Do you believe that 100 PSI would be adequate  
20 to cause a NIBCO 1006 PEX system to fail in a manner  
21 other than oxidative degradation?

22 A Experience has taught that it likely would  
23 not be.

24 Q But it could?

25 A I don't believe that it could, not in a



1        **manner we have seen in the incident pipes at issue in**  
2        **this case.**

3            Q        But in other pipes that you've seen in other  
4        cases, if it does turn out that the pressure readings  
5        for the Molony case indicated the system was at a  
6        hundred PSI, in other cases where you've looked at  
7        other pipes, that could be sufficient to cause those  
8        failures?

9            MR. EDWARDS:    Object to the form.

10           THE WITNESS:    You're asking me to speculate  
11        on a hypothetical that doesn't exist.    Again, as I've  
12        said before, anything is possible.    If they neglected  
13        to cross-link the pipe, maybe it could fail at a  
14        hundred PSI due to overpressurization.    I don't know.  
15        I suppose anything is possible.    But I'm not aware of  
16        any instance in field returned pipe where a hundred PSI  
17        has led to a ductile rupture due to overpressurization  
18        in NIBCO pipe.    And, in fact, burst testing that we  
19        have performed in multiple cases has indicated that the  
20        pressure would need to be more on the order of 8- to  
21        900 PSI for such a failure to occur.

22        BY MR. KUHLMAN:

23           Q        That's for a burst failure; right?

24           A        **That's exactly the mechanism you're referring**  
25        **to.    You're referring to a burst mechanism.**

1           Q     So are you saying that in the Molony case the  
2     failure was akin to a failure that you might see as a  
3     result of a burst test?

4           A     **Yes, I am.**

5           Q     Have you maintained your file for that  
6     matter?

7           A     **I have no idea. I don't know if it's been**  
8     **discarded at this point or not.**

9           Q     Okay. All right. Let's talk about your  
10    report for a little while. We seem to have been  
11    neglecting it for some time. If you could, please turn  
12    to page 12 of your report.

13          A     **Which report are you referring to?**

14          Q     The report that you drafted in this matter.  
15    Your initial report, not the supplemental report.  
16    March 2, 2007, Exhibit 2.

17          A     **Okay. For the record, I feel certain the**  
18    **Molony report does not state that the pressure was**  
19    **100 PSI.**

20          Q     Okay. Well, we'll find out.

21                Before we talk about page 12, what are some  
22    of the disinfectants that are used by water treatment  
23    facilities in the U.S.?

24          A     **Chlorine and chloramine are the two most**  
25    **common disinfectants.**

1           Q     And do those two disinfectants react to PEX  
2     tubing in the same way?

3           A     **The PEX tubing reacts to the disinfectant**  
4     **more so than the disinfectant reacting to the tubing.**  
5     **The tubing does not necessarily react in the same way**  
6     **to each of those disinfectants. Chlorine is considered**  
7     **to be the more aggressive disinfectant.**

8           Q     And is it your opinion that the NIBCO PEX  
9     tubing is insufficient for use in water systems that  
10    are sanitized using chlorines?

11          A     **It is my opinion that the NIBCO tubing is**  
12    **insufficiently stabilized for potable water**  
13    **applications, period, whether a disinfectant is present**  
14    **or not as demonstrated by the oxidative degradation and**  
15    **crazing observed in the Medder residence.**

16          Q     How many tubing samples have you looked at  
17    that were in service in a home where chloramines were  
18    used to disinfect the tubing -- or to disinfect the  
19    water in the system? I'm sorry.

20          A     **I don't know that I have an answer to that**  
21    **question. We were focused primarily on chlorine.**

22          Q     So it's your opinion based on an analysis of  
23    zero tubing samples that were in systems where  
24    chloramines were the disinfectant used by the  
25    municipality that NIBCO tubing was insufficient for

1       that purpose?

2           A       The only installation where I would have any  
3       confidence in saying chloramine may not have been used  
4       would be the Medder residence where they utilized well  
5       water. There are other -- there are other  
6       municipalities associated with the incident pipes at  
7       issue in these cases where chloramines were reportedly  
8       used.

9           Q       In addition to chlorine?

10          A       In addition to or possibly instead of. It is  
11       not uncommon for both disinfecting agents to be used  
12       simultaneously by municipalities.

13          Q       Which municipality specifically relied  
14       exclusively on chloramines?

15          A       I don't know that any of them relied  
16       exclusively on any one disinfectant or another. I know  
17       that the Sminkey residence, that municipality has  
18       reported that they at times will incorporate chloramine  
19       and may be doing that routinely now. The water  
20       chemistry testing also suggested that there may have  
21       been some chloramine interference going on in that  
22       home.

23                   What we do know is that chlorine is the more  
24       aggressive condition. And it is typical in the  
25       industry to focus interest on chlorine rather than

1 chloramine as we have done in this case, which is why  
2 the chlorine resistant standard exists.

3 What we also know is that the presence or  
4 absence of the insufficient stabilization that has  
5 rendered these pipes vulnerable to failure is not  
6 dependent upon the water chemistry.

7 Q And the water chemistry, let's talk about  
8 that just a little bit more. You said that it's not  
9 dependent on the water chemistry.

10 How many homes have you analyzed where  
11 chlorine was not used as a disinfectant in the water  
12 system?

13 A I don't recall as we sit here today.

14 Q In all the pipes samples that you've looked  
15 at, how many of them were in use in a system that  
16 didn't have chlorine at all?

17 MR. EDWARDS: Objection. Asked and answered.

18 THE WITNESS: I don't recall as we sit here  
19 today.

20 BY MR. KUHLMAN:

21 Q Can you think of any other than the Medders'  
22 house that had the well water?

23 MR. EDWARDS: Objection.

24 THE WITNESS: I don't recall as we sit here  
25 today.

1 BY MR. KUHLMAN:

2 Q Do you remember your work on the Christensen  
3 case?

4 A Vaguely.

5 Q And do you remember that Christensen had  
6 operations in both Austin and in San Antonio?

7 A I do.

8 Q And do you remember how Christensen used  
9 NIBCO's 1006 product in Austin in over 18,000 houses?

10 A I don't recall specific numbers. I don't  
11 recall necessarily what was installed where.

12 Q Does that sound vaguely familiar to you that  
13 there were many, many, many houses piped by Christensen  
14 in Austin with 1006 tubing?

15 MR. EDWARDS: Object to the form.

16 THE WITNESS: Actually, it doesn't sound  
17 familiar to me.

18 BY MR. KUHLMAN:

19 Q And in the Christensen case, do you recall  
20 how in that 18,000-house set of houses in Austin there  
21 were only three failures in all the NIBCO PEX  
22 installations? Do you remember that?

23 A I don't recall your number being accurate. I  
24 have no idea whether it's accurate or not. It may be.  
25 I do not recall.

1                   What I do recall is that there was a group of  
2                   houses -- whether they were in Austin or not, I don't  
3                   recall -- in an area that was believed to have been  
4                   treated primarily with chloramines that, as we would  
5                   expect, appeared to be showing a slower rate of  
6                   failure. I also understand that that situation may  
7                   have changed since the Christensen case.

8                   BY MR. KUHLMAN:

9                   Q       Are you aware of any failures at all of NIBCO  
10                   1006 tubing that was in use in a strictly chloramine  
11                   system?

12                   A       I don't know that I know the answer to that  
13                   question.

14                   Q       The question is do you know of a single  
15                   failure of NIBCO 1006 tubing in a system where it was  
16                   disinfected with chlorine?

17                   MR. EDWARDS: Object to the form.

18                   THE WITNESS: And I answered the question.  
19                   The question was -- I don't know the answer to that  
20                   question. I don't know whether there have been any  
21                   pipes that I have looked at that there were in systems  
22                   that were exclusively treated with chloramine or not.  
23                   I don't recall.

24                   BY MR. KUHLMAN:

25                   Q       So based on the fact -- are you relying on

1       this one house, the Medder home with well water, to  
2       conclude that NIBCO 1006 tubing is insufficient for all  
3       houses that are disinfected with something other than  
4       chlorine or use no disinfectant whatsoever?

5               **A       No. As well established in my report, the**  
6       **bases for my opinions are very clearly outlined in the**  
7       **reports and they clearly go well beyond the Medder**  
8       **residence.**

9               Q       What's the difference with respect to how  
10       aggressive chloramines are compared to chlorine?

11              A       I don't recall off the top of my head. But  
12       it has been studied and there's literature addressing  
13       the differences that was published by PPI. There's a  
14       position paper that was published by PPI addressing  
15       that very issue. And that was part of the impetus for  
16       the development of the chlorine resistance test.

17                      **(Exhibit 7 Marked for Identification.)**

18       BY MR. KUHLMAN:

19              Q       All right. We'll mark this as Exhibit 7.  
20       You referred to a statement put out by the Plastic Pipe  
21       Institute addressing the difference in aggressiveness  
22       between chloramines and chlorine. I've handed you a  
23       document that's marked as Exhibit 7. Does this appear  
24       to be the revised version of that statement that was  
25       prepared and circulated -- prepared for circulation on



1 July 9, 2013?

2 A It appears to be the revised version, yes,  
3 issued in 2013 as you said.

4 Q Okay. And then in the results section of  
5 this, it says "After the testing was completed, failure  
6 times of the PEX pipe specimens tested with the free  
7 chlorine test fluid were compared to failure times of  
8 the PEX pipe specimens tested the chlorines test fluid,  
9 the results showed pipe failure times approximately  
10 40 percent longer when tested chlorines compared to  
11 testing with free chlorine in otherwise identical test  
12 conditions." Do you see that?

13 A I do see that.

14 Q Do you disagree with these findings?

15 A I don't agree or disagree. I didn't  
16 participate in that testing at all. I accept that  
17 that's what they've said here.

18 Q Did you take any steps to assess how  
19 chloramines impact the life expectancy of NIBCO 1006  
20 PEX tubing?

21 A Not in this case. We know from empirical  
22 experience in the field that the anticipated result so  
23 far with NIBCO pipe would reflect what has been  
24 projected here, that we would expect pipes that are in  
25 a primarily chloramine environment to generally oxidize

1       more slowly than pipes that are subjected to a  
2       primarily chlorinated environment.

3           Q       And you're not aware of a single  
4       chloramine-induced failure in NIBCO PEX tubing.

5                   Is that fair?

6           MR. EDWARDS:   Object to the form.   Asked and  
7       answered.

8           THE WITNESS:   I don't believe that is fair to  
9       say, no.

10       BY MR. KUHLMAN:

11           Q       Okay.   Can you tell me where one NIBCO 1006  
12       piece of PEX tubing failed as a result of oxidative  
13       degradation in a chloramine disinfectant system?

14           A       I believe that the Sminkey residence would be  
15       one example where there was a significant level of  
16       chloramine present and we saw rapid oxidative  
17       degradation.   I don't know if it was exclusively  
18       chloramine.   I've said before I don't know if there are  
19       any that I've looked at that were exclusively  
20       chloramine.   If there's something specific you'd like  
21       to point me to from my past work, I'll be happy to  
22       review it.   But I don't recall as we sit here today.

23           Q       So if I understand your answer, as you sit  
24       here today, you can't say with certainty that you've  
25       inspected a tubing sample that failed as a result of

1       oxidative degradation in a system that was exclusively  
2       disinfected by chloramines?

3           A       I cannot say that with certainty as we sit  
4       here today. What I can say with certainty is --

5           Q       Let's just get to the question.

6           A       Let me finish. What I can say with certainty  
7       is that I have evaluated pipe that was exposed to  
8       neither chlorine nor chloramine, which would clearly be  
9       the less aggressive environmental condition than either  
10      of those two disinfectants being present. And even  
11      when neither of those disinfectants was present in any  
12      detectable concentration, we saw evidence of oxidative  
13      degradation and craze cracking happening in less than  
14      10 years of service in a normal potable water  
15      environment in the absence of elevated pressure and in  
16      the absence of elevated temperature. We know that the  
17      pipe was insufficiently stabilized for the intended  
18      application.

19                   Whether you have no disinfectant present or  
20      whether you have chloramine or whether you have  
21      chlorine really doesn't affect that conclusion in any  
22      way. At best, it might affect your time to failure.  
23      But it's not going to mean the difference in pipe being  
24      in a defective condition and oxidation occurring or it  
25      not being defective and it not occurring.

1           Q     And you base that conclusion on an analysis  
2     of zero tubing samples that you are sure failed in a  
3     chloramine disinfectant system.

4           MR. EDWARDS: Object to the form.

5           THE WITNESS: No, sir. I base that  
6     conclusion upon my thorough inspection of nearly a  
7     thousand pieces of field returned NIBCO pipe of various  
8     sizes, various colors, various years of manufacture,  
9     coupled with my analysis of testing that was performed  
10    by NIBCO, a review of the documents that have been  
11    produced in this case, communications between NIBCO and  
12    other agencies validating all of that. My conclusions  
13    are not in any way based upon the findings related to  
14    any specific home. Please don't misrepresent that.

15    BY MR. KUHLMAN:

16           Q     Okay. Of the thousand tubing samples that  
17    you've looked at, how many of those pertained to the  
18    Christensen case?

19           A     I don't recall specifically. I believe it  
20    was -- it was hundreds. I don't recall the number.

21           Q     Would it be the overwhelming majority of  
22    these thousand samples?

23           A     I wouldn't necessarily say it was the  
24    overwhelming majority. It may have been a majority.  
25    But there were also hundreds associated with Mi Casita,

1 and there were over 150 associated with these two class  
2 actions.

3 What we do know is we have now looked at pipe  
4 from roughly 11 different states and they have all  
5 looked the same from Pennsylvania to Baja Mexico and  
6 different water municipalities with different treatment  
7 practices, different installation practices, some with  
8 cold water applications where failures have occurred,  
9 some with hot water applications, some with recirc,  
10 some with not -- no recirc. And we have found only one  
11 common thread that weaved these unique failures and  
12 that is the design and formulation of the 1006 pipe.

13 Q You would agree with me that installation  
14 errors can accelerate the rate of failure in NIBCO's  
15 1006 tubing, would you not?

16 A I wouldn't agree with that as a whole  
17 statement categorically. There are some types of  
18 installation issues --

19 Q Such as?

20 A -- that can influence the rate, such as if  
21 you have any degree of bend in the pipe, that would be  
22 a natural point of increased stress with the degree of  
23 increase of stress being relative to the degree of  
24 bend. That could influence the rate of propagation  
25 through the wall or the time to initiation or the

1 orientation of the crack. It does not cause the  
2 material to oxidize however.

3 Q Have you done anything to attempt to quantify  
4 how installation stresses that you've seen in the field  
5 can shorten the life expectancy of NIBCO's 1006 PEX  
6 pipe?

7 A To what extent? In what manner?

8 Q At all. Have you attempted to quantify how a  
9 bend, for example, might impact the rate to failure for  
10 one of these NIBCO tubing pieces?

11 A It's been qualitatively assessed through  
12 examination of the failures. We know that the degree  
13 of bend or lack thereof can certainly influence the  
14 orientation of a crack. As a rule, cracks that occur  
15 in regions of bend typically will occur in the  
16 circumferential direction across the pipe or possibly  
17 at a 30 to 45-degree angle, whereas cracks that form in  
18 straighter sections of pipe tend to form in the  
19 longitudinal direction. We do know that.

20 And we know that, if there is any appreciable  
21 bend, whether it's an acceptable degree of bend or an  
22 excessive degree, we tend to see clusters of cracks  
23 that may form at that location. So certainly bending  
24 can influence the location or orientation of where  
25 cracking might manifest through wall first.

1           Q     Do you have an opinion with respect to how  
2           long NIBCO's 1006 tubing would last in a system that  
3           was disinfected with chlorines exclusively?

4           A     Based upon our cumulative experience with  
5           these products, I would have to say less than 10 years  
6           in many cases.

7           Q     Okay. And --

8           A     There is no one set answer for that, though,  
9           you understand.

10          Q     And you say that, and yet this product has  
11          been on the market since at least 2006. And you've  
12          traveled to 11 different states and have looked at a  
13          thousand different samples and you haven't seen a  
14          single failure in a chloramine piece of tubing?

15               MR. EDWARDS: Object to the form.

16               THE WITNESS: I disagree with what you're  
17          saying. I don't believe that's what I have said in any  
18          way.

19          BY MR. KUHLMAN:

20          Q     Or at least you can't identify one for me.

21          A     Chloramines have absolutely been used in  
22          these homes. I did look at the Christensen case at  
23          some of the homes from wherever the area was that was  
24          believed to have had primarily chloramine treatments.  
25          So I disagree with what you are saying and I believe

1       you are mischaracterizing my testimony.

2           Q     Is it your opinion today that in any of the  
3       homes in the Meadow case that an extrusion defect was  
4       the cause of a failure?

5           A     I don't recall seeing any failure that I  
6       believed an extrusion defect was the root cause of  
7       failure. There may have been cases. Certainly there  
8       were cases collectively among the class actions where  
9       extrusion defects were exacerbating factors where we  
10      saw extrusion lines, we saw chunks of charred polymer,  
11      we saw dimples that had clearly served as preferential  
12      sites for initiation. But again, that is merely an  
13      exacerbating condition where localized stresses would  
14      make it easier for that crack to initiate sooner and/or  
15      to grow more quickly than it might have in the absence  
16      of that condition. But I have not assigned that as a  
17      root cause in any way.

18          Q     Okay. You've referred to residual stresses a  
19      few times during the course of this deposition. And  
20      it's your opinion, is it not, that NIBCO's  
21      manufacturing process resulted in residual stresses  
22      being present in these tubing samples; is that right?

23          A     Yes.

24          Q     And my question is did you take any steps to  
25      measure the amount of residual stress that was observed



1 in the NIBCO 1006 PEX tubing?

2 A Not in a quantitative manner, although we can  
3 and reserve the right to do so if we feel it necessary.  
4 In this particular case, the fact that the cracks are  
5 gaping wide open clearly reveals that there was an  
6 unusually high level of residual stress in those pipes  
7 in contrast to my prior experience with PEX pipe. It's  
8 very clear that there was a high level of residual  
9 stress relative to the norm.

10 Q Do PEX pipes gape wide open as a result of  
11 burst testing?

12 A Not in the manner that these pipes did. They  
13 will look very different when they fail due to burst  
14 testing. That's not gaping. That's deformation.  
15 They're different.

16 Q Okay. So do you actually plan on measuring  
17 the residual stresses in the pipe?

18 A I don't have a plan for how we will move  
19 forward after today. We'll see what happens in the  
20 case. And I plan to do whatever I am required to do or  
21 need to do in order to address the issues that arise.

22 Q Okay. And you talked a little bit about  
23 NIBCO selling tubing that was out of round in your  
24 report. And I'm looking on page 68 if you want to  
25 bring it up. And what you state here in Number 18 on

1 page 68 is "Many of the incident pipes and companion  
2 pipes examined from the Meadow and Cole class actions  
3 were found to exhibit a greater degree of out of  
4 roundness than the maximum permitted by ASTM 876."

5 How did you measure for out of roundness?

6 **A What do you mean when you say how did I**  
7 **measure? I used a caliper and measured in accordance**  
8 **with the governing ASTM standard.**

9 Q And did you take an average?

10 **A We measured at five different locations and**  
11 **evaluated that in accordance with the standard. If you**  
12 **have a copy of the standard, I'd be happy to walk you**  
13 **through the process.**

14 Q Is it your opinion that this out of roundness  
15 was the root cause of any of the failures in the Meadow  
16 plaintiff homes?

17 **A No.**

18 Q In Number 19 you state "No evidence was found  
19 to suggest that overpressurization, excessive water  
20 temperature, excessive UV exposure, or atypical water  
21 chemistry contributed significantly to failure of the  
22 incident tubing in any of the pipes investigated from  
23 the Meadow or Cole class actions."

24 When you were performing your home  
25 inspections, you observed overpressurization in two out

1 of the three homes in the Meadow class action case; is  
2 that true?

3 **A That is correct. Slightly overpressurized.**  
4 **Slightly. Yes.**

5 Q With one being as high as 92 PSI when you  
6 measured it. Does that sound right?

7 **A I believe the Meadow residence was 92 PSI the**  
8 **second time we measured it.**

9 Q Okay. And is it your understanding that on a  
10 home, if you take a data logger, that the pressure can  
11 fluctuate during the course of the day up and down in a  
12 home?

13 **A Sometimes it can. It doesn't always**  
14 **appreciably but sometimes it can.**

15 Q Did you take any steps to determine if the  
16 homes in the Meadow case had pressure spiking or  
17 dropping lower than what you saw when you did your  
18 reading?

19 **A No.**

20 Q But based on your understanding of how these  
21 systems work, it could have gone higher than 92 and it  
22 could have gone lower than 92 at the Meadow home, for  
23 example?

24 **A It could have.**

25 Q And what steps did you take to determine that

1 the tubing at the Meadow house and those failures were  
2 not contributed to significantly by overpressurization?

3 A Well, several things. One is the appearance  
4 of the fractures and what's happening in the fracture  
5 initiation region for the incident pipes. Second thing  
6 is the oxidation that was confirmed at the interior  
7 surface of the pipe and the crazing and most  
8 importantly the comparison of all of that data and the  
9 characteristics of the incident pieces of pipe when  
10 compared to other very similar, in fact, virtually  
11 identical failures that occurred in homes where  
12 pressures were as low as 35, 45, 55 PSI, in that range.  
13 I don't recall the specific numbers. The pressure was  
14 roughly half in these other homes what we observed in  
15 the Meadow residence, and yet the failures, the pipe  
16 dimensions, and so forth were very, very similar,  
17 strikingly similar.

18 Q Why do you use the qualifier "significantly"  
19 here when you say "contributed significantly to failure  
20 of the incident tubing"?

21 A "Significant" would imply that there is  
22 something discernible that is different. We saw that  
23 there was real no discernible appreciable difference in  
24 these pipes. They failed in an essentially identical  
25 manner. So if there was any contribution at all from

1 pressure -- and there probably was in terms of the rate  
2 maybe if they had initiated at exactly the same time,  
3 which they probably did not -- we would expect it to in  
4 theory increase the rate of propagation through the  
5 wall of the pipe. But it didn't significantly  
6 contribute to it in the sense that it did not  
7 contribute to the mechanism of crack initiation that  
8 started the whole process. It didn't cause the  
9 oxidation to occur when it wouldn't have otherwise. It  
10 didn't cause the pipe to be insufficiently stabilized.  
11 It didn't cause the pipe to exhibit nonuniform  
12 distribution of stabilizer when tested by Jana before  
13 it had been in contact with pressure or water.

14 Q Jana didn't test the plaintiffs' houses pipe  
15 samples. Fair?

16 A They tested other field returned pipe samples  
17 and they also tested NIBCO's new as-manufactured pipe,  
18 which is critical. When we compare the new pipe that  
19 had never been exposed to pressure in the Meadow  
20 residence, we see very similar patterns of distribution  
21 to the stabilizer when we look by OIT and we see  
22 similarities with other homes that did not have high  
23 pressure.

24 Q Do you have any way of knowing how high the  
25 pressure in the Meadow home got when the NIBCO 1006

1 tubing was installed there?

2           **A     I have no reason to believe that it got any**  
3 **higher than what we measured that day, nor do I have**  
4 **any reason to believe it went appreciably lower.**

5           Q     You just don't know either way. You have no  
6 way of knowing what the pressure was in that house when  
7 you weren't there and no one was logging in?

8           **A     No. What I do know is that the failure**  
9 **mechanism that did --**

10          Q     I appreciate that you --

11          **A     Please let me finish my answer.**

12          Q     Please just answer the question and then we  
13 won't have to do all this back and forth. It was a  
14 very simple question.

15               MR. EDWARDS: She was in the process of  
16 answering the question.

17 BY MR. KUHLMAN:

18          Q     I appreciate you want to expound on things.  
19 But let's try to keep it limited to what the question  
20 is, answer. Let's do that.

21               MR. EDWARDS: Your advice is noted. Now feel  
22 free to finish your answer.

23               THE WITNESS: Could you please read it back?  
24 I've completely lost my train of thought.

25                       (Record read as requested.)

1           THE WITNESS: What I do know is the failure  
2 mechanism that did occur in that home was not in any  
3 way discernibly different from the failure mechanisms  
4 that occurred in homes that had half the pressure that  
5 existed in that home. Therefore, we know that pressure  
6 really didn't matter. I really don't care what the  
7 pressure went to. My goal is not to know what the  
8 pressure was in that house. My goal is to determine if  
9 pressure was a root cause of failure in these pipes.

10           And we absolutely have sufficient information  
11 to conclude within a reasonable degree of scientific  
12 certainty that the answer is no. It did not cause  
13 these pipes to fail. It did not contribute in a  
14 significant way. And clearly the manifestation of this  
15 defect is not dependent upon having elevated pressure,  
16 be it excessive or not excessive. It's not dependent  
17 upon pressure or temperature or the manner of  
18 installation or the composition of the water or the  
19 type of disinfectant that was used or the presence or  
20 absence of a nail hole or anything else happening with  
21 this pipe. That defect exists universally from day one  
22 without regard to the pressure. I don't need to know  
23 what the pressure went to in order to know that.

24 BY MR. KUHLMAN:

25           Q     In the Meadow homes -- you would agree with

1 me that the installation that you observed in both  
2 Meadow and I believe it was the -- was it the Plisko  
3 home that had the other high pressure reading?

4 **A No.**

5 Q Which other house in the Meadow family of  
6 cases or Meadow houses had high pressure when you took  
7 the reading?

8 **A If you would like to point me to a certain**  
9 **place in my report where I state that, I'll be happy to**  
10 **review it with you.**

11 Q Okay. Let's just move on. Is it accurate  
12 that oxidation can form in a piece of tubing after a  
13 crack has initiated?

14 **A By what mechanism? Oxidation can occur under**  
15 **any condition in the PEX tubing, the 1006 formulation.**

16 Q My question is in the 1006 PEX tubing, it's  
17 possible that a crack can initiate as a result of  
18 overpressurization prior to there being oxidation  
19 present in the tubing. Fair?

20 **A I've never seen that. Anytime I have ever**  
21 **seen a crack occur due to overpressurization, there was**  
22 **also oxidation present. Did I state that correctly?**

23 Q And that's after the crack propagates all the  
24 way through the wall; right?

25 **A My investigation was done after the pipe had**



1       leaked, yes --

2               Q       Correct.

3               A       -- there was oxidation. So we cannot say as  
4       you did that the overpressurization occurred before the  
5       oxidation. They were both present when I evaluated the  
6       pipe.

7               Q       Right. And so my question is couldn't it  
8       also be true that a crack could initiate prior to  
9       oxidation being present in NIBCO's 1006 PEX tubing?

10              A       Based upon what we have seen empirically, I  
11       don't believe that that is correct. If you have my  
12       Christensen report here, I would like to check one  
13       thing to clarify that answer.

14              Q       Did you assess any locations in the tubing  
15       for the Meadow class away from where the actual crack  
16       was to determine if there was oxidation present?

17              A       I don't recall as we sit here today. And  
18       what do you mean by "away"? Certainly we didn't test  
19       anything right at the site of failure. So we would  
20       have been at least a few inches away when we prepped  
21       our samples. At best we would have been within an inch  
22       and a half to 2 inches.

23              Q       And you would expect to see some level of  
24       oxidation present on a piece of tubing that's been in  
25       service for six or seven years. Isn't that fair?

1           A     In NIBCO's PEX 1006 pipe, yes, I would. Yes,  
2     I would.

3           Q     And you would expect to see some level of  
4     oxidation present on any type of PEX tubing that's been  
5     installed for six or seven years; right?

6           A     Not necessarily. Based upon my experience, I  
7     would not expect to necessarily see measurable  
8     oxidation and certainly not to the degree that we have  
9     in this case. If you have the Christensen report,  
10    there is something that I would be happy to go over  
11    with you in relation to that.

12          Q     So my question for you is -- I mean, it's  
13    really kind of a chicken and egg question for me. How  
14    did you conclude that the oxidation occurred prior to  
15    crack initiation when you haven't observed -- let me  
16    just ask you that.

17                How did you conclude that the crack  
18    initiation occurred prior to oxidation?

19               MR. EDWARDS: Object to the form.

20               THE WITNESS: I can't answer that question  
21    adequately without the photos that were contained in my  
22    appendices. Do you have the scanning electron  
23    microscope images?

24               BY MR. KUHLMAN:

25          Q     Which SEM images would you need to refer to

1 to assess that?

2 A I don't know the file names but I will  
3 recognize the image if you have them handy. To answer  
4 your question, we can look at the fracture surface and  
5 we can see very clearly what was going on in the  
6 initiation region. We see a well-defined oxidized  
7 layer that we can actually measure. We know the depth  
8 of it in many cases where we put those samples in the  
9 scanning electron microscope. There is no question  
10 that these fractures initiated due to brittle oxidative  
11 degradation in the PEX material and that that was the  
12 initiating mechanism.

13 Studies have shown that the initiation life  
14 in PEX pipe can account for 80 to 90 percent in some  
15 cases of the pipe's life. The bulk of the time in  
16 failure is spent in the initiation process. Once that  
17 crack initiates and reaches a significant depth, which  
18 will depend upon stresses acting on the crack, it will  
19 then grow by creep rupture due to the hydrostatic  
20 stress in the system. We see very distinctly on those  
21 fractures that two different mechanisms are at play.  
22 So there is no question regarding the initiation  
23 mechanism and whether or not oxidation occurred causing  
24 the crazing that led to failure of the pipes.

25 Q Are you aware of any studies that have been

1 conducted addressing how to determine which occurred  
2 first? A crack or oxidation?

3 A Which occurred first? A crack or oxidation?

4 Q Right.

5 A The failure process as the material oxidizes  
6 and craze cracks form. Yes. That's been documented  
7 extensively. In fact, there are pictures of that in  
8 the supplemental report.

9 Q If you would, please turn to page 16 of the  
10 supplemental report.

11 MR. EDWARDS: That is Exhibit 3.

12 THE WITNESS: The three pipes that are shown  
13 at the top of these figures are from a pipe that was  
14 reportedly exposed in the accelerated chlorine test by  
15 Patrick Vibien at Jana Laboratories. These are photos  
16 that have been produced by Don Duvall in other prior  
17 publications before this case, outside of this case, as  
18 well as in -- within the Duvall and Shaw report that  
19 was issued on behalf of NIBCO in this case.

20 These samples were deliberately oxidized in a  
21 chlorine resistance test. They were characterized by  
22 NIBCO's experts as being severely oxidized in surface  
23 and brittle. And you can see very clearly, there are  
24 many, many cracks present in these samples that form as  
25 a part of the oxidative degradation process.

1           You seem in your question to be trying to  
2       separate them, that cracks form before or after. They  
3       don't form before or after. They form during as part  
4       of a mechanism. It is part of the oxidative  
5       degradation process for these cracks to form and grow  
6       through wall. They happen concurrently.

7           And when you look below those pictures, what  
8       you are seeing are virtually identical photos showing  
9       field returned samples associated with the Meadow and  
10      Cole plaintiffs. You see on the left, the red pipe  
11      with a number of arrows pointing to different cracks  
12      that are propagating through wall. Those are from the  
13      Sminkey residence where we believe that there was  
14      primarily a treatment process utilizing chloramines.  
15      Whether it was exclusively chloramines or not, I don't  
16      believe that it was. I think they were used together.

17           In the next photo in the middle row, you see  
18      samples from the Cole residence. And in those photos,  
19      you see very clearly -- I'll be happy to put arrows on  
20      this if we need to. You see very clearly a  
21      well-defined layer of oxidation with crack growth  
22      propagating off of that with numerous crazed cracks  
23      that are virtually identical to the ones shown above  
24      from the chlorine tested sample.

25           When you move to the right in the middle row,

1       you're looking at a sample from the Plisko residence  
2       where, again, you see extensive crazing and cracking  
3       and you see a separation fracture at the top of the  
4       image that is growing in a manner very similar to the  
5       one shown above for the chlorine-tested sample.

6       BY MR. KUHLMAN:

7               Q       Let me ask you a question about these  
8       pictures. So I'm looking at the pictures that are in  
9       the top row here and the pictures in the second row,  
10       which are the ones that you included in your report,  
11       claim to be identical.

12                   What's the difference in a scale on these  
13       photos?

14               A       I can't tell as we're sitting here today  
15       looking at them. What I can tell you is the scale  
16       doesn't really matter. If you look at the two on the  
17       left, certainly you see the full thickness of the wall.  
18       So what you should be focusing on is the depth of crack  
19       penetration through the wall, the number of cracks that  
20       are present, and the overall morphology of those cracks  
21       in terms of their width, their pointed tips, their lack  
22       of branching, their lack of ductility, their lack of  
23       stress whitening, their lack of ductile fibrils. Those  
24       are all virtually identical between these photos.

25                   It does appear as the one on the bottom row

1 is at a higher magnification, but you still see the  
2 full thickness of the pipe wall. So your eye should  
3 readily accommodate that difference.

4 Q And in the second one over from the right, is  
5 that before or after a bend back test?

6 A That was when a fracture was exposed.

7 Q Okay.

8 A So those cracks would have been effectively  
9 subjected to a modified bend back test where they are  
10 being opened up to some degree.

11 Q And so --

12 A Not exclusively.

13 Q After you bent that tubing, you put it in the  
14 SEM. When you get that close to just about anything, I  
15 mean, you're going so to see a lot of surface  
16 characteristics that can look a little wonky, can you  
17 not?

18 A I would disagree with that wholeheartedly.  
19 In fact, I'd be more than happy to review some lower  
20 mag shots. We certainly have them. If you have them  
21 with you, I'll be happy to go through those with you.

22 There's no question that these samples  
23 exhibited numerous craze cracks. So that's photo  
24 documented in a variety of ranges. And we reserve the  
25 right to do further photo documentation if necessary.

1           Q     Slow crack growth can also cause cracks to  
2     initiate in the tubing wall. Fair?

3           A     Slow crack growth is not a fracture  
4     mechanism. Slow crack growth is a term that describes  
5     a rate of crack growth.

6           Q     And cracks can initiate as a result of  
7     excessive pressures in the system. Fair?

8           A     Not that I have seen in this case. They can  
9     if the pressures are high enough. If you have a burst  
10    test sample, for example, certainly they have initiated  
11    and failed due to the burst stress.

12          Q     Is it your position that excessive bending in  
13    an installation cannot cause NIBCO 1006 PEX tubing to  
14    have a crack initiate on the interior wall in the  
15    absence of oxidative degradation?

16               MR. EDWARDS: Object to the form.

17               THE WITNESS: I have never seen a field  
18    returned NIBCO pipe that did not exhibit oxidation at  
19    the interior surface of the pipe. Based on the  
20    formulation of this pipe and the empirical experience,  
21    I believe that it would be impossible for a crack to  
22    form in the absence of oxidation because I believe that  
23    they are going to be oxidizing from day one.

24               BY MR. KUHLMAN:

25          Q     What method are you using to assess the level



1 of oxidation on the interior wall of the PEX tubing?

2 A To assess the level. Could you be more  
3 specific, please?

4 Q You keep saying that you've observed  
5 oxidation at the interior wall of the tubing. And I'm  
6 asking you what method you used to determine that  
7 there's oxidation on the interior wall of the NIBCO  
8 1006 PEX tubing you're looking at?

9 A We've used multiple methods.

10 Q Okay. Let's start with the first. What's  
11 the first?

12 A The first is we visually inspect these and we  
13 look at the type of failure that has occurred with the  
14 incident pipes and we see that they are consistent with  
15 what we would expect for oxidative degradation.  
16 They're brittle slits initiating at the interior  
17 surface of the pipe as a rule.

18 Secondly, we look at the interior surface  
19 under a stereomicroscope and we typically see  
20 chalkiness to varying degrees. And we see craze  
21 cracking to the interior surface of the pipe that will  
22 only form when there is a brittle oxidized layer at the  
23 interior surface of the pipe. We then open these  
24 fractures up and we look at them in the scanning  
25 electron microscope as we have done here. And again,

1 we see evidence of extensive crazing with well-defined  
2 depth that is further consistent with oxidative  
3 degradation in the PEX material.

4 We've also analyzed those initiation regions  
5 by energy dispersive x-ray spectroscopy and have found  
6 increased levels of oxygen associated with those  
7 initiation regions as we would expect for oxidative  
8 degradation.

9 Q Are you able to determine if that oxygen is  
10 actually bound to the tubing wall or is just present?

11 A I'm sorry. I wasn't finished with my answer.  
12 May I finish please? And then I'll answer that  
13 question.

14 Q Sure.

15 A We have further analyzed these pipe samples  
16 by FT-IR to actually measure, if you will, a signal  
17 that is indicative of oxidation in the PEX material.  
18 Detecting the presence of a carbonyl peak in an FT-IR  
19 spectra clearly demonstrates the presence of oxidation.  
20 And based upon a relative comparison of the area under  
21 that peak relative to another peak in the spectra that  
22 isn't dependent upon sample thickness were able to get  
23 a semiquantitative comparative measure that allows us  
24 to draw some conclusions about that pipe.

25 And finally, we have looked at these pipes by

1 differential scanning calorimetry to determine the  
2 oxidation induction time. And we have found that the  
3 loss of stabilization would support oxidation. So it's  
4 a variety of methods that have allowed us to conclude  
5 that the pipes have failed due to oxidative  
6 degradation.

7 Q All right. So could you answer my question  
8 about the EDR work with respect to the oxygen? Is that  
9 something that's just observed on the surface of the  
10 tubing such that it might be dissolved water, for  
11 example, or is that something that was observed to be  
12 bound to the tubing itself?

13 A The test method is EDX not EDR.

14 Q EDX. I'm sorry. I misspoke.

15 A And in terms of the oxygen that is present,  
16 EDX is not merely a surface analysis technique. It  
17 does penetrate into the surface of the sample. And we  
18 are not looking just at the interior surface of the  
19 pipe. We are looking at the actual fracture surface at  
20 what is happening within the pipe wall on the exposed  
21 fracture surface. I believe that that oxygen is likely  
22 bound. It would not be from water. Water does not  
23 dissolve, and oxygen would not separate from water.  
24 Water evaporates. So no, it did not come from the  
25 water. Some portion of the oxygen could have been

1       associated with a metal oxide, but the bulk of it would  
2       have to relate to the PEX material just looking at the  
3       volume of PEX material that's being analyzed relative  
4       to a thin layer of surface deposits.

5           Q     And you said it's "likely bound." How would  
6       one determine with certainty that it is or isn't?

7           A     You would look for a carbonyl peak by FT-IR  
8       which results from oxidation. Oxidation results from  
9       the oxygen being present.

10          Q     And it's your position that the FT-IR work  
11       you did for the Meadow plaintiff homes showed the  
12       presence of oxidation on the samples that you  
13       inspected?

14          A     There is no question that these samples are  
15       oxidized. And I don't believe that that point has been  
16       in dispute. I believe that NIBCO's experts have agreed  
17       that oxidation was detected in these samples. In fact,  
18       they went so far as to quantify the degree of oxidation  
19       that exists in these samples.

20          Q     And do you rely on any kind of standard when  
21       you perform your FT-IR work?

22          A     I do.

23          Q     Which one?

24          A     I don't recall as we sit here today. I would  
25       need to reference the report for the specific number to

1       do that.

2           Q     Are you familiar or do you know what brand  
3     FT-IR you use?

4           A     We used a PerkinElmer FT-IR for this  
5     particular analysis, but I have used a variety of FT-IR  
6     instruments.

7           Q     Okay. And the FT-IR work you've done in this  
8     case, has that all been part of the ATR method?

9           A     Not -- when you say "this case."

10          Q     For the Meadow case.

11          A     In evaluating NIBCO pipe, no, it has not  
12     been. Specific to Meadow, yes, we opted to use the ATR  
13     method for expediency.

14          Q     And what about specific to Cole?

15          A     We used the ATR method for both of these  
16     cases.

17          Q     And how deep does the -- how deep into the  
18     pipe wall are you looking at when you're doing an  
19     analysis using the ATR method of FT-IR?

20          A     It's very, very shallow. I would have to  
21     look at the manufacturer's specs to quantify the  
22     specific depth of penetration but it is very, very  
23     shallow. It is essentially a surface analysis  
24     technique. It is not a technique that is dependent  
25     upon the thickness of the sample, which is part of the

1       reason it's advantageous.

2                   (Exhibit 8 Marked for Identification.)

3       BY MR. KUHLMAN:

4           Q     Okay. If you could, please turn back to  
5       page 3 in this document. In here on the left-hand  
6       column it says that "The evanescent wave or bubble only  
7       extends beyond the crystal half of a micron to  
8       5 microns"; is that right?

9           A     That is what it states. And that's probably  
10      applicable to the instrument I used as well. I don't  
11      know what model of instrument this is applicable to.  
12      But it is a PerkinElmer brand, and that is  
13      approximately the range that I had in my head.

14          Q     Okay. And what is a micron?

15          A     It's a measure of length.

16          Q     Compared to, like, an inch.

17          A     It's a measure of length. I would need to  
18      look at the actual conversion factor for micron. It's  
19      very, very small.

20          Q     Can you do the conversion to a millimeter or  
21      an inch?

22          A     Not as we sit here today. If you want to let  
23      me use your computer, I'd be happy to do it.

24          Q     So this FT-IR testing that you're doing with  
25      the ATR method, it's assessing if there is the presence

1 of any oxidation at the half of a micron to 5-micron  
2 deep range; is that right?

3 **A That's correct. You can essentially have**  
4 **confidence that you are looking at the surface you are**  
5 **analyzing with very little influence from underlying**  
6 **material.**

7 Q How much oxidation on a pipe surface is  
8 necessary before it starts to degrade?

9 **A There's no set answer to that. It is**  
10 **degrading when it's oxidizing. It is degrading. And**  
11 **there's no set answer to that question.**

12 Q How much oxidation needs to be present on the  
13 surface of a NIBCO 1006 pipe sample before the pipe is  
14 in danger of having a crack initiate?

15 **A There is no set answer to that either.**

16 Q Are you able to determine -- in your mind  
17 does the presence of oxidation pursuant to this FT-IR  
18 testing indicate to you how long a pipe might last?  
19 Let me back up.

20 Have you done this FT-IR work on any sections  
21 of tubing 3 or more feet away from a failure?

22 MR. EDWARDS: Object to the form.

23 THE WITNESS: I don't recall where the  
24 samples came from specifically relative to a failure.  
25 Our efforts would tend to be focused closer to a

1 failure, but I can't guarantee that I haven't looked  
2 further away. I've looked at new pipe where no failure  
3 had occurred in the Christensen matter.

4 BY MR. KUHLMAN:

5 Q Okay. When you looked at new pipe, was there  
6 oxidation present on the surface layer?

7 A I don't recall. But if you have my report  
8 with you, I'd be happy to review it with you.

9 Q Have you taken any samples of the FT-IR on  
10 the exterior of a pipe sample?

11 A We have.

12 Q Do you remember what you found?

13 A It's reported in my report.

14 Q Okay. So that's in the Meadow case?

15 A Yes. We've looked at the mid wall region,  
16 we've looked at the OD surface, and we've looked at ID  
17 surface. And we've compared those both in the pipe  
18 wall and at 90-degree intervals around the  
19 circumference of the pipe. You should have that data.  
20 It was included in the appendices of the report,  
21 although it's not produced here today.

22 (Exhibit 9 Marked for Identification.)

23 BY MR. KUHLMAN:

24 Q When you're performing this FT-IR work, let  
25 me just hand you a document. We'll mark it as



1 Exhibit 9.

2 MR. EDWARDS: We need to have a break soon.  
3 Maybe after you --

4 MR. KUHLMAN: Let's have a break now. It's  
5 as good as a time as any.

6 (Off the record 3:18 p.m. to 3:44 p.m.)

7 BY MR. KUHLMAN:

8 Q All right. We are back on the record after a  
9 short break. Ms. Smith, before the record [sic] handed  
10 you a document that's been marked as Exhibit 9 I  
11 believe. And what is this document?

12 A It is ASTM Designation Standard F2102 - 06,  
13 standard guide for evaluating the extent of oxidation  
14 in ultra high molecular weight polyethylene fabricated  
15 forms intended for surgical implants.

16 Q Okay. And is this a standard or a standard  
17 guide and is there a difference?

18 A It says standard guide, which means it's  
19 offering guidance on a test methodology.

20 Q Okay. So this wouldn't be a required test.  
21 It would be -- this is just guiding someone, an option.

22 A It's offering an accepted test methodology.

23 Q And did you review this standard and attempt  
24 to perform your FT-IR work in general accordance with  
25 this standard?

1           **A     Yes.**

2           **Q     And when you said you performed the work in**  
3           **general accordance with this standard, what exactly**  
4           **does that mean? Which parts did you not follow**  
5           **specifically?**

6           **A     Well, it's not uncommon to have to deviate**  
7           **from any test standard in terms of sample preparation.**  
8           **Primarily, most standards assume that a manufacturer is**  
9           **starting with resin and that they have the ability to**  
10          **make plaques or coupons or some type of specific test**  
11          **sample. When you're working with field returned**  
12          **product, you have to modify that. So that is the**  
13          **primary deviation from this standard.**

14          **Q     So in terms of sample preparation?**

15          **A     Yes. We were working with field returned**  
16          **pipe and we're working with pipe, period. We're not**  
17          **working with resin at all. We're working with field**  
18          **returned product.**

19          **Q     And is there a difference between ultra high**  
20          **molecular weight polyethylene and the polyethylene**  
21          **resins that are used in PEX piping?**

22          **A     Specific to NIBCO PEX piping, yes. They used**  
23          **a high density polyethylene resin that may or may not**  
24          **have had sufficiently high molecular weight to have**  
25          **been classified as an ultra high molecular weight**

1       **polyethylene.**

2           Q     Do you know one way or the other if it had a  
3     high enough density to be -- what is it you referred  
4     to? High density and what was the other? Ultra high  
5     molecular weight?

6           A     In many of the documents produced in this  
7     case, NIBCO's resin was referred to as an HDPE  
8     material, high density polyethylene. I would have to  
9     look at the manufacturer's specific information related  
10    to that resin to know if that was a proper  
11    representation of their material or not as to whether  
12    it really was an ultra high molecular weight  
13    polyethylene or not. They refer to it in documents  
14    that were produced as high density polyethylene. But  
15    polyethylene materials oxidize by forming carbonyl  
16    peaks in consistent areas that are detected when you  
17    analyze those by FT-IR.

18          Q     And is that also true with respect to  
19    polyethylene once it's been cross-linked?

20          A     Yes.

21          Q     Did you review any studies that talked about  
22    the use of this standard to analyze PEX tubing?

23          A     I don't understand your question.

24          Q     Are you aware of anyone in the scientific  
25    community utilizing this standard to analyze oxidation

1 in PEX tubing?

2 **A Yes.**

3 Q Who?

4 **A Me for one. Other PEX manufacturers have in**  
5 **certain cases used this same methodology. It's not**  
6 **uncommon to use this methodology for a wide variety of**  
7 **applications related to the oxidation of polyethylene**  
8 **components.**

9 Q Which other manufacturers utilize this  
10 standard to analyze oxidation in PEX tubing?

11 **A We used a similar procedure at Uponor.**

12 Q Are you aware of any others in the PEX  
13 industry that use this?

14 **A Not off the top of my head as we sit here,**  
15 **but it would not at all be surprising if they do. That**  
16 **would not be at all surprising.**

17 Q Okay. I'd like to direct your attention to  
18 4.1.1.1 on page 1, and it states here that "Other modes  
19 of collection, that is percent reflection, attenuated  
20 total reflection, and so forth, and aperture in  
21 increment sizes may be used to generate the samples'  
22 absorption spectrum provided they can be demonstrated  
23 to produce equivalent results as transmission  
24 absorption spectrum."

25 What did you do to ensure that the ATR method

1       you were using would produce equivalent results to the  
2       transmission absorption spectrum with respect to the  
3       samples in this case?

4               MR. EDWARDS: Object to the form.

5               THE WITNESS: I have used both methods for  
6       many, many, many years to evaluate a variety of  
7       polyolefin materials. So first of all, based upon my  
8       experience, I know that we get adequately equivalent  
9       results for them to be sufficient for the purpose for  
10      which we use this data.

11              Secondly, in the Christensen matter, we  
12      analyzed certain pipe samples by both methods. So we  
13      know there that we got similar results.

14      BY MR. KUHLMAN:

15              Q     Okay. And when you performed this testing,  
16      did you calculate a surface oxidation index with  
17      respect to the tubing samples at issue in these class  
18      cases?

19              A     We calculated a carbonyl index for the  
20      surfaces and the areas of the pipe wall that were  
21      analyzed. It was not always considered a surface if it  
22      was a mid wall sample. But yes, we calculated a  
23      carbonyl index.

24              Q     And I was referring to the surface oxidation  
25      index as it's defined here on page 1. Was that one of

1 the calculations that you performed with respect to the  
2 samples that you tested pursuant to this standard?

3 A Which section are you referring to?

4 Q 3.1.5.

5 A Well, certainly the surface analyses that we  
6 did would be a surface of interest. But we also have  
7 looked at the oxidation index at the mid wall region of  
8 the pipe, which would not be considered a surface for  
9 the pipe.

10 Q Okay. If you could, please turn to -- keep  
11 this out because we're going to come back to this. But  
12 turn to page 52 in your report.

13 A Which report?

14 Q Your Meadow report, the original one, the  
15 March 2, 2017, report.

16 MR. EDWARDS: What page?

17 MR. KUHLMAN: 52.

18 THE WITNESS: Okay.

19 BY MR. KUHLMAN:

20 Q Okay. And it looks like this is a table.  
21 This is Table 5 in your report. And does this reflect  
22 the results that you obtained from your FT-IR work that  
23 was done in general accordance with this standard guide  
24 that we're talking about here, Exhibit 9?

25 A It is a reflection of my calculations that

1       were done in accordance with the 2013 version of this  
2       standard. We are looking at the '06 version.

3           Q     Okay. I don't have the '13 version with me.  
4       Are you aware of any changes between '06 and '13 with  
5       respect to this standard?

6           A     I haven't looked. We would have to look at a  
7       redlined version to know if anything changed.

8           Q     That's fine. And I see here we have the  
9       oxidation index as the far right column on this table.

10          A     Yes.

11          Q     All right. And so what to you is the  
12       oxidation index and what does it mean with respect to  
13       these NIBCO 1006 tubing samples?

14          A     I don't think I understand your question.  
15       Could you please clarify that?

16          Q     Okay. What is an oxidation index as you've  
17       used this term in Table 5 of your report?

18          A     It is a ratio of the area, the oxidation peak  
19       area for the peak centered around 1720 inverse  
20       centimeters in the FT-IR spectra divided by the  
21       normalization peak area for the peak that is centered  
22       around 1370 inverse centimeters in the same FT-IR  
23       spectra. It is a ratio of those two peak areas.

24          Q     Okay. Is there a -- what's the significance  
25       of these numbers? Is higher more oxidation? Is lower

1 more oxidation? What does that mean?

2 A A bigger number would indicate a greater  
3 degree of oxidation.

4 Q And does a sample have to have a zero here to  
5 indicate that there is no effect of oxidation on the  
6 tubing sample?

7 A We have not evaluated these numbers to assess  
8 the degree of effect on the sample. We have evaluated  
9 these numbers to affect the -- to reflect the  
10 distribution of oxidation within the wall of the pipe  
11 and around the circumference of the pipe.

12 Q Is there a number that can be calculated  
13 here, you know, as you move up the scale -- well,  
14 strike that. Let me start over.

15 Is any amount over zero significant to you in  
16 terms of how the oxidation will impact performance on  
17 NIBCO's 1006 pipe?

18 A Any number over zero tells me that there is  
19 detectable oxidation in that pipe at the point where we  
20 analyzed the sample.

21 Q At what point, you know, is it a problem?

22 A There is no defined point at which it's a  
23 problem. And it would be a gross error to suggest that  
24 there is.

25 Q Okay. So this oxidation index only indicates



1       that there is the presence of oxidation but it doesn't  
2       necessarily signify an amount that would be -- an  
3       amount of oxidation that's going to cause a failure,  
4       for example?

5           **A       It's not that it doesn't necessarily. It**  
6       **doesn't, period. Because these samples are not created**  
7       **equally. They have varying degrees of residual stress.**  
8       **They have varying degrees of the cross-linking. They**  
9       **have varying applied stresses associated with the**  
10      **manner of installation. And so the degree of oxidation**  
11      **that can allow a crack to form in a brittle surface**  
12      **layer will depend in large part upon the level of**  
13      **stress that's acting at that specific location in the**  
14      **pipe and whether or not there are any localized stress**  
15      **risers that exist concurrently with those stresses.**

16           **Q       Would it be accurate to say that you can have**  
17      **oxidation present in a tubing sample, but if there are**  
18      **no stresses acting on that tubing, there won't be a**  
19      **failure such that there's a leak?**

20           **A       You will never, ever have a piece of PEX**  
21      **tubing that has no stress acting on it. That scenario**  
22      **will never exist. It can never exist. There will**  
23      **always be stress acting on the tubing.**

24           **Q       And would that be from the water pressure**  
25      **inside the tube?**

1           A     For one. But that's not the only source of  
2     stress.

3           Q     What are the other sources of stress on,  
4     let's say, NIBCO 1006 PEX tubing in a standard  
5     installation?

6           A     There will be inherent residual stress that  
7     exists in that PEX material before it ever even goes  
8     into service. And then you will have  
9     installation-related stresses associated with that, and  
10    you will also have hydrostatic acting on those  
11    components. So the total stress picture is a  
12    combination of residual stress plus applied stress or  
13    stresses in different orientations plus your  
14    hydrostatic stress plus any localized stress  
15    concentrations that exist within the wall of that pipe.  
16    And those stresses may vary in any location within the  
17    pipe wall based, in part, on the degree of  
18    cross-linking that exists in the pipe and what else is  
19    happening in the pipe.

20          Q     Given what you just said, I think you'll  
21    agree with this. But if you could, take a look back at  
22    the standard, Exhibit 9. Flip over to the back. And  
23    there's a section marked X 1.8 and it says "At the  
24    present time, there's no clear correlation between the  
25    extent of oxidation or the oxidation profile present in

1 the sample of UHMWPE and its functional  
2 characteristics. For this reason, no maximum SOI, MOI,  
3 or BOI has been specified in this document."

4 **A Absolutely. There is no way particularly**  
5 **with field returned plumbing pipe that you could even**  
6 **begin to try to say that there is some**  
7 **one-size-fits-all threshold above or below which a**  
8 **certain degree of oxidation would not matter under all**  
9 **circumstances.**

10 Q All right. And I believe in your  
11 supplemental report, you compared the relative accuracy  
12 of your method of performing FT-IR work with the method  
13 that was used by ESI. Do you remember talking about  
14 that in your supplemental report?

15 **A I do. If you could point me to the specific**  
16 **page, that would be helpful.**

17 Q Well, unfortunately I don't have that right  
18 in front of me. So I cannot. All right.

19 **A I may be able to find it.**

20 Q That's okay. Let's move on. I appreciate  
21 your looking.

22 MR. KUHLMAN: Can we take a 30-second break?  
23 Let's go off the record.

24 MR. EDWARDS: Sure.

25 (Off the record 4:00 p.m. to 4:20 p.m.)

1 (Exhibit 10 Marked for Identification.)

2 (Exhibit 11 Marked for Identification.)

3 BY MR. KUHLMAN:

4 Q All right. We are back on the record after a  
5 quick break here. Before we took a break, I handed you  
6 two documents which we have marked as 10 and 11.  
7 Exhibit 10 is a copy of a report. Well, let me ask  
8 you, what is Exhibit 10?

9 A It is Vanguard Material Sciences Report  
10 Number 2014235, which is an inspection report related  
11 to reportedly CPI Dura-PEX plumbing pipe from the  
12 Michelle Molony, M-o-l-o-n-y, and Robert Ingraham --  
13 the way I've spelled it here is I-n-g-r-a-h-a-m --  
14 residence.

15 Q Okay. And did you prepare this report?

16 A I did.

17 Q And did you prepare it for Attorney Kent  
18 Smith?

19 A Yes.

20 Q Do you remember who Mr. Smith represented in  
21 this case?

22 A I believe that he represented the homeowners  
23 if I remember correctly.

24 Q Okay. If you could, please turn to page 2 of  
25 this document. And three paragraphs down it says

1 "According to the homeowner, this plumbing system was  
2 originally installed in 2007 by All Pro Plumbing. From  
3 December 2009 through June 2014, at least 23 leaks  
4 occurred in various locations throughout the plumbing  
5 system due to failure of the PEX pipe."

6 Did I read that right?

7 A Yes. You did read that right. I'm sorry. I  
8 have to say I'm a little bit distracted wondering if  
9 there is any kind of a protective order related to  
10 this. I don't recall specifically if there is or if  
11 there is not. Do we know?

12 MR. EDWARDS: I don't know.

13 MR. KUHLMAN: I received it from your  
14 attorney. So I assume it's okay for me to have it.

15 THE WITNESS: I have permission to produce  
16 the report. I don't recall if there is a protective  
17 order. I do have written permission to release the  
18 report. Am I okay to talk about this?

19 MR. POLAKOFF: Can we go off the record for a  
20 second?

21 MR. KUHLMAN: Sure.

22 (Off the record 4:22 p.m. to 4:24 p.m.)

23 BY MR. KUHLMAN:

24 Q Okay. We are back on the record here after a  
25 quick break. And we talked about off the record if the

1 reports that were marked as Exhibit 10 and 11 needed to  
2 be treated as confidential. And I believe what we all  
3 agreed on is that, once the transcript comes in, we'll  
4 all collectively have an opportunity to look at the  
5 testimony and the reports and mark it as confidential  
6 or not pursuant to the protective orders that are in  
7 place in our respective cases. So with that  
8 understanding, I think we can move forward and talk  
9 about these a little bit more.

10 So this -- first, where did this inspection  
11 take -- well, first, did you inspect this plumbing  
12 system at the home?

13 **A I did not.**

14 Q Okay. Do you know where this home is  
15 located?

16 **A I believe the report documents that somewhere**  
17 **if I remember correctly. I don't recall where it was**  
18 **located.**

19 Q I show it says it here on page 2 in the  
20 second paragraph. "The samples were removed from  
21 service at a residential plumbing application at  
22 8 Spring Valley Court, Pinehurst, North Carolina."

23 Do you have any reason to dispute that  
24 sitting here today?

25 **A No, I do not.**

1           Q     And this particular system had two different  
2     recirculation loops; is that right?

3           A     **As I recall, yes. We refer to those as**  
4     **Systems A and Systems B. And there were three separate**  
5     **water heaters associated with those two closed loop**  
6     **systems.**

7           Q     And at the time this installation went in,  
8     there was no pressure relief valve installed in between  
9     the house and the municipal water supply; is that  
10    right?

11          A     **That's what I was told, yes.**

12          Q     And if you could please flip over to page 3.  
13    I'd like to direct your attention down to Number 5.  
14    And it indicates "Pressure gauges used to monitor the  
15    water pressure in the incident plumbing system  
16    documented system pressures greater than or equal to  
17    100 PSI at a set temperature of approximately 125  
18    degrees Fahrenheit. Literature published by NIBCO,  
19    Inc., who purchased the assets of CPI in 2006 and who  
20    subsequently manufactured Dura-PEX using CPI's process  
21    and formulation states that the operating pressure  
22    limit for Dura-PEX pipe exposed to chlorinated hot  
23    water is 80 PSI." Did I read that correctly?

24          A     **I believe that you did.**

25          Q     Does this refresh your recollection that the

1 water pressure observed in this house was either  
2 greater than or equal to 100 PSI?

3 MR. EDWARDS: Object to the form.

4 THE WITNESS: It refreshes my recollection  
5 that the pressure gauges that were used to monitor the  
6 water pressure only measured up to 100 PSI and that the  
7 gauges were pegged when they were used. The  
8 pressure -- the needle on the pressure gauge was beyond  
9 the 100 PSI number and it was pegged against the stop  
10 peg. It was positioned against the stop peg on the  
11 gauge. So the maximum number that the gauge offered  
12 was a hundred PSI. So we know that the pressure was  
13 beyond that. We know that it was greater than a  
14 hundred PSI, certainly at the time that measurement was  
15 made, and that at other times it was a hundred PSI or  
16 below.

17 BY MR. KUHLMAN:

18 Q Okay. And so did you install any kind of  
19 different pressure gauge to determine if the pressure  
20 in the system went up or down during the course of the  
21 day?

22 A I did not do a site inspection. The  
23 homeowner had reportedly monitored pressure using a  
24 pressure gauge. I don't remember now what his  
25 background was, if it was as an engineer or as a



1 contractor. I remember that he had experience with  
2 that type of process and that he had been monitoring  
3 the pressure. And I know what he reported. And  
4 through the attorney, it was reported to me that they  
5 also had an engineer go out to the site to inspect the  
6 system who independently measured the pressure and  
7 found the pressure to be in excess of a hundred PSI.  
8 The gauge was pegged at that time as well.

9 The homeowner -- as I recall and I believe  
10 this is addressed in here somewhere, the homeowner  
11 reported measuring fluctuating pressures.

12 Q And did you observe any pictures of the  
13 gauge? Or when you describe it as pegged, is that the  
14 way it was described to you?

15 A That's the way it was described to me.

16 Q Okay. So --

17 A That's why it was in the background section.  
18 It was presented to me as facts to rely upon.

19 Q And did you take any steps to determine what  
20 it meant when the gauge was pegged, for example? Is  
21 there any conclusion you can reach that tells you  
22 specifically what the pressure was above 100?

23 A It was above 100 at that time.

24 Q Or it could have been 100?

25 A No. It was above 100 at that time. If it

1       **was a hundred, it would sit at a hundred.**

2           Q       When the pressure situation was described to  
3       you as fluctuating, to me, it could only be fluctuating  
4       down; right? If it's pegged at a hundred, the only way  
5       you know it's fluctuating is if the gauge goes down.

6                   Is that fair that the pressure was going to a  
7       hundred and then down below a hundred and back?

8           **A       It's not going just down. If it's**  
9       **fluctuating, it's going down and up and down and up.**  
10       **It's going both directions. We need to try to find**  
11       **where this is addressed in this report because I know**  
12       **that it is. The homeowner reported a range of**  
13       **pressures that he asserted he had documented through**  
14       **pressure testing. So the pressures would have had to**  
15       **have necessarily been at every level between those**  
16       **numbers at some point.**

17           Q       So it says here on page 2 "The homeowner  
18       reportedly observed readings that fluctuated from  
19       approximately 60 PSI to greater than or equal to  
20       100 PSI, the gauge maximum."

21           **A       Yes, yes.**

22           Q       So within this house, pressure was  
23       fluctuating as much as 40 PSI or more as reported by  
24       this homeowner. Is that fair?

25           **A       Yes.**

1           Q     And do you consider that to be something  
2     unique to this home?

3           A     In my experience, we don't normally see those  
4     types of pressure fluctuations. The pressure can  
5     fluctuate, but it rarely fluctuates to that degree.  
6     More importantly, we don't normally see pressure gauges  
7     pegged beyond a hundred PSI in potable water systems.  
8     That's certainly an unusual condition.

9           Q     And what steps specifically have you taken  
10    over the course of your investigations regarding PEX to  
11    determine how much pressure can fluctuate in the  
12    system?

13          A     Well, I have 16 years of experience in the  
14    PEX plumbing industry in which we have evaluated the  
15    pressure in a number of homes using both single point  
16    measurements and using pressure monitoring equipment to  
17    observe what happens to pressure over time.

18          Q     And if you could, please turn to page 5. So  
19    it looks like you described a couple different samples  
20    here that were submitted to you for examination. And  
21    my question for you is, is it your understanding that  
22    these were tubing samples that were manufactured by CPI  
23    or NIBCO or do you not know?

24          A     At the time I believed them to be  
25    manufactured by CPI because CPI is what was printed on

1 the pipes. When we get to the revised version of this  
2 report, we will see that additional samples were  
3 removed from the same residence that were also labeled  
4 in some cases CPI but with date codes that correspond  
5 to dates beyond the time when NIBCO purchased CPI's  
6 assets. I did not know all of that at the time. What  
7 I now know is that those particular pipes would had to  
8 have been manufactured by NIBCO despite any labeling  
9 that might be present on the pipe.

10 Q All right. If you could, please turn to  
11 page 6.

12 MR. EDWARDS: Are we still on Exhibit 10?

13 MR. KUHLMAN: Yeah. We're still on  
14 Exhibit 10.

15 BY MR. KUHLMAN:

16 Q And if you could please -- this is the  
17 section entitled "Stereomicroscopy." And I'd like to  
18 direct your attention to the second paragraph of this  
19 section. This section describes where there's a crack  
20 that is found to be longer and more open. And I think  
21 you described this previously as a gaping crack.

22 Is this what you were talking about?

23 A I would have to look at the pictures. But  
24 no, not necessarily. All cracks tend to grow in a --  
25 in PEX tubing tend to grow with some degree or other of

1       V-shaped morphology. If a crack exhibits any degree of  
2       greater opening at the interior surface than the  
3       exterior surface while simultaneously being longer at  
4       the interior surface than at the exterior surface, that  
5       is suggestive of interior surface initiation.

6           Q     Would you still agree that you would expect  
7       to see the crack initiate at the interior surface of  
8       the pipe for a fracture resulting from excessive hoop  
9       stress associated with elevated water pressure?

10           A     Yes.

11           Q     Okay. And if you look down to the next  
12       paragraph, it says "Little or no evidence of craze  
13       cracking (which results from oxidative degradation of  
14       the PEX material) was noted indicating that oxidation  
15       of the PEX material did not contribute significantly to  
16       the failure of the incident pipe."

17                   As I read that sentence, you're concluding  
18       that this failure was not caused as a result of  
19       oxidation of the PEX material.

20           A     I believe that that leak was not caused by  
21       oxidation of the PEX material as a primary driver.  
22       That would not be the predominant mechanism.

23           Q     And if you look down two more paragraphs, it  
24       says "Only very limited crazing was observed adjacent  
25       to the incident crack further indicating that" --

1           **A     I'm sorry. I need to find where you are.**

2           Q     I'm on page 6 down at the last paragraph.

3           **A     The last paragraph. Okay.**

4           Q     It says "Only very limited crazing was  
5           observed adjacent to the incident crack further  
6           indicating that creep rupture was the predominant  
7           failure mechanism for the incident pipe."

8                     So is it fair -- it was your conclusion at  
9           that time that limited amounts of crazing can be  
10          observed on a NIBCO or CPI 1006 PEX tubing sample and  
11          oxidation would not necessarily be the primary cause of  
12          the failure?

13          **A     The primary cause of that leak.**

14          Q     Of that leak.

15          **A     As we said before, PEX tubing can fail due to**  
16          **a variety of reasons, be it a nail hole, be it**  
17          **overpressurization with stress rupture, a rodent**  
18          **chewing the pipe. And those processes can happen**  
19          **concurrently and simultaneously. So there's a**  
20          **difference between determining if a manufacturing**  
21          **defect exists within the pipe or design defect exists**  
22          **within a pipe and determining the cause of a specific**  
23          **leak. In this case, I concluded that the cause of that**  
24          **leak did not appear to be from the oxidation.**

25          Q     This section continues, "The few craze cracks

1       that were observed in the vicinity of the incident  
2       crack were preferentially oriented parallel to the  
3       longitudinal incident crack. This indicated that hoop  
4       stress significantly influenced the initiation and  
5       propagation of both the incident crack and the adjacent  
6       fine crazed cracks as craze cracks typically grow in  
7       the radial direction in the absence of excessive hoop  
8       stress and/or pronounced pressure fluctuations."

9           **A       It probably should have said "also grow in**  
10       **the radial direction." But yes, that's what it says.**

11           **Q       And do you still agree with that as a general**  
12       **proposition?**

13           **A       Generally, yes. Oxidative degradation**  
14       **typically manifests as craze cracks that, in the**  
15       **absence of influence from a particular stress field,**  
16       **will grow in a grid-like pattern where they grow both**  
17       **longitudinally and radially. And when you see a**  
18       **predominance of growth in one orientation only, that**  
19       **tells you something important about the stresses that**  
20       **are acting on the pipe causing those crazes to open up**  
21       **in that brittle surface.**

22           **Q       Okay. If you could look down to the section**  
23       **entitled "Dimensional Inspection." And the second**  
24       **paragraph there states "Each companion pipe was also**  
25       **found to exhibit an excessively large outer diameter**

1 suggesting that the entire plumbing system was exposed  
2 to excessive water pressure due to the absence of a  
3 whole home PRE."

4 Is it your opinion sitting here today that  
5 excessive amounts of pressure in a system can cause an  
6 excessively large outer diameter to be seen in pipes  
7 that have been removed from service, PEX pipes?

8 A It can particularly if the pressure is high  
9 and particularly if the degree of cross-linking in a  
10 pipe is low. Yeah, it certainly can.

11 Q All right. If you could, please turn back to  
12 page 8. And this is in the section titled  
13 "Conclusions" here.

14 A I'm sorry. I need to elaborate on that  
15 answer a little bit if I'm going to provide a complete  
16 answer. Yes. Elevated pressure can certainly expand  
17 PEX tubing and it can cause the OD to be out of spec,  
18 particularly if pressures are high and the degree of  
19 cross-linking is low. However, that is not the only  
20 reason that PEX tubing can exhibit, particularly NIBCO  
21 PEX tubing, can exhibit an excessive outer diameter. A  
22 review of NIBCO manufacturing records has demonstrated  
23 in hindsight that many, many, many reels of NIBCO pipe  
24 went out the door exhibiting an excessive outer  
25 diameter. So it's not the only condition that can



1       cause pipe diameter to be out of spec when we look at  
2       field returned pipe.

3           Q       With respect to the many, many, many reels of  
4       tubing that you just referenced, did any of those reels  
5       at some point contain any of the tubing from any of the  
6       plaintiffs' homes in these cases?

7           A       Yes.

8           Q       Okay. Which plaintiffs had tubing samples  
9       that exhibited an expanded outer diameter at the time  
10      of manufacturing based on your review of NIBCO's  
11      quality control records?

12          A       I don't recall as we sit here. But it's  
13      documented in my reports for the Meadow and Cole class  
14      actions. I don't recall which report or how many  
15      reports, but it is documented specifically.

16          Q       And were those expanded outer diameters so  
17      large that the crimp rings would no longer fit on the  
18      tubing or were they able to connect the tubing to the  
19      fittings?

20          A       They were able to connect the tubing to the  
21      fittings. The reason the outer diameter becomes  
22      important relative to the Meadow and Cole class actions  
23      and to other cases where NIBCO pipe has failed during  
24      service is because NIBCO as a matter of routine when  
25      they evaluate field returned products through their PER

1 inspection process, they would measure outer diameter.  
2 And if they found the outer diameter to be outside of  
3 the specified range, in accordance with ASTM F876, they  
4 concluded, from what I've been able to see, without  
5 exception that that was an indicator that the system  
6 was overpressurized and they have used that as their  
7 reason to deny claims related to these products.

8 That clearly is not the case. There have  
9 been documented instances where incident pipe was found  
10 to exhibit excessively sized outer diameters at the  
11 time that pipe was sold before it ever went into  
12 service. So clearly those excessive diameters did not  
13 result from exposure to excessive pressure. Pressure  
14 was not a significant factor.

15 Q Did you determine if any of the claims -- or  
16 any of the tubing samples that were returned as part of  
17 warranty claims, did you attempt to determine if any  
18 claims were denied on samples that were reported to  
19 have an expanded outer diameter as a result of pressure  
20 but when compared to the manufacturing records it  
21 appeared that there was no expansion whatsoever of the  
22 outer diameter?

23 A I don't believe that I saw that. There were  
24 only a few field returned pipes where we had date codes  
25 that I was able to find in the manufacturing records to

1 do that comparison.

2 Q And when you did that comparison for the few  
3 that you were able to do, what did you find?

4 A I found that they were, indeed, excessive in  
5 their outer diameter at the time of manufacture.

6 Q Had they expanded further in service?

7 A Not appreciably. And in some cases, maybe  
8 not all. We would have to look back at the actual  
9 numbers to see. It would not be unexpected to see some  
10 degree of expansion.

11 The point of that piece of knowledge and the  
12 important takeaway from it is that we cannot assume  
13 that, because pipe shows an out of spec diameter, that  
14 that means the pipe was overpressurized. Clearly it  
15 does not. It is equally probable, if not more so based  
16 on what I've seen, that the pipe was likely made with  
17 an excessively large outer diameter and/or with an  
18 out-of-round condition that would at least give an  
19 excessively large outer diameter on one plane.

20 Q Okay. Circling back to Exhibit 10, the date  
21 on this report is September 16, 2014; right?

22 A Correct.

23 Q This is a fair and accurate copy of the  
24 report that you prepared for this Molony matter; is  
25 that right?

1           **A     As far as I can tell as we sit here, yes.**

2           Q     And looking back to your conclusions and  
3           specifically the conclusions that are referenced here  
4           on page 8, I'm looking at Number 4. Your conclusion as  
5           a result of your investigation in this Molony matter is  
6           "It can be concluded with a reasonable degree of  
7           scientific certainty that the primary cause of crack  
8           propagation through the wall of the incident pipe was  
9           excessive water pressure."

10                   That was one of your conclusions, is it not?

11           **A     Yes.**

12           Q     And after you prepared this report --  
13           actually, before we do that, if you could, flip back a  
14           couple pages to page 13, please. And I'd like you to  
15           take a look at Images C, D, and E.

16                   What are we looking at here in C, D, and E?

17           **A     Well, the figure caption says "Closer views**  
18           **of the incident pipe, Pipe A -- reference Figure 1 --**  
19           **shown after the pipe was sectioned in two locations to**  
20           **isolate areas of interest with crack-like linear**  
21           **indications in the exterior surface of the pipe,**  
22           **encircled, (Views C and D). The linear indication**  
23           **visible in View C proved to be scratch while the**  
24           **indication shown in Views D and E proved to be**  
25           **through-wall crack. Magnified views of the crack are**

1       **provided in Figure 8."**

2           Q       And this was the report that you prepared in  
3       September of 2014. I've handed you another document.  
4       It's marked as Exhibit 11. And this is what appears to  
5       be Revision A of the same report prepared on October 8,  
6       2014; is that right?

7           **A       Yes.**

8           Q       Do you remember why you prepared a second  
9       report for this case?

10          **A       Yes.**

11          Q       Why did you do a second report?

12          **A       Because they submitted additional samples.**  
13       **So I was incorporating the additional findings related**  
14       **to the supplemental samples.**

15          Q       Okay. And so is this exhibit a fair and  
16       accurate copy of that supplemental report you prepared?

17          **A       To the extent that I can tell, it appears to**  
18       **be, yes.**

19          Q       And does this report -- without going through  
20       it word by word, accurately describe the work, the  
21       supplemental work that you did in response to receiving  
22       those additional samples?

23          **A       I believe that it would, yes.**

24          Q       Okay. And if you look back to -- well, let  
25       me just ask you, as a result of doing the additional

1 work in this case, did your opinions appreciably  
2 change? The conclusions?

3 **A I don't recall. I would have to put them**  
4 **side by side and compare them.**

5 **(Exhibit 12 Marked for Identification.)**

6 BY MR. KUHLMAN:

7 Q Okay. All right. Let's move on. I'd like  
8 to ask you a few questions about a document I'm going  
9 to go ahead and mark as Exhibit 12.

10 Okay. What is Exhibit 12?

11 **A It is ASTM Standard Designation F2098 - 08,**  
12 **standard specification for stainless steel clamps for**  
13 **securing SDR9 cross-linking polyethylene (PEX) tubing**  
14 **to metal insert and plastic insert fittings.**

15 Q Okay. And you've expressed some opinions in  
16 your report about stainless steel clamps that were  
17 either manufactured or distributed by NIBCO, have you  
18 not?

19 **A I have.**

20 Q All right. And what's your opinion with  
21 respect to the stainless steel clamps that were either  
22 manufactured or distributed by NIBCO for its 1006  
23 tubing products?

24 **A With respect to what? My opinion with**  
25 **respect to what?**

1           Q     With respect to those clamps.

2           A     To what aspect of those clamps?

3           Q     Is it your opinion that there's anything  
4 wrong with them?

5           A     I believe that they are defectively designed  
6 due to the alloy that was specified in the clamps which  
7 renders them susceptible to failure by stress corrosion  
8 cracking in the presence of chlorides.

9           Q     Okay. So this is similar to your opinion  
10 with respect to the F1807 fittings that we talked about  
11 earlier. It's your position that the stainless steel  
12 clamps are defective in their design because of the  
13 alloy selected and used?

14          A     That is a part of it. It is also because of  
15 the design of the clamp itself which causes the clamp  
16 when it's properly installed to be subjected to tensile  
17 stresses that approach the yield strength for the  
18 material. The combination of the tensile stresses and  
19 the susceptibility of the material renders it  
20 vulnerable to failure in the presence of chlorides.  
21 You have to have both, the stress and the  
22 susceptibility of the material.

23          Q     So this is my fault because I asked a bad  
24 question. Circling back over to the F1807 brass  
25 fittings either manufactured or distributed by NIBCO

1       that had more than 15 percent zinc content in them, is  
2       it your position that those were defectively designed  
3       for some other reason aside from the alloy?

4           **A       The alloy composition in the brass is the key**  
5       **factor. If the composition were such that there was**  
6       **less than 15 percent zinc, the fitting would not have**  
7       **been susceptible to stress corrosion cracking or to**  
8       **dezincification. Both of those require the zinc**  
9       **content to be higher than 15 percent for those**  
10       **mechanisms to manifest in potable water applications as**  
11       **a rule.**

12           Q       Does this F1807 essentially provide, like, a  
13       guide for a manufacturer on here's the design of a  
14       tubing -- not a tubing -- a copper -- or an insert  
15       fitting that you can use in a potable water -- this is  
16       a bad one.

17                   MR. SHAMBERG:   Want to start over?

18           BY MR. KUHLMAN:

19           Q       That one got a little away from me there.  
20       Let's leave that one alone.

21                   Okay. So if you'll look here on the first  
22       page of Exhibit 12, down in Section 5.1, it says  
23       "Clamps. Clamps shall be made from material meeting  
24       the requirements of specification A 240/A 240M  
25       stainless steel UNS S304000." Did I read that right?



1           **A     You did.**

2           **Q     Is it your understanding that NIBCO used**  
3           **stainless steel UNS S304000 for its stainless steel**  
4           **clamps for its 1006 PEX clamp product?**

5           **A     I believe they intended to use 304 stainless**  
6           **steel, which would be UNS alloy, UNS S304000. Specific**  
7           **chemical analysis results indicate that not all of the**  
8           **clamps necessarily conformed to that specification.**

9                   **It's important to recognize, however, that**  
10           **this standard is providing an option for a clamp**  
11           **material. It does not mean that the manufacturer must**  
12           **use stainless steel clamps. They have the option of**  
13           **using copper crimp rings alternatively as they have**  
14           **done. They sell both.**

15           **Q     Okay.**

16           **A     "They" being NIBCO. Sorry.**

17           **Q     And with respect to the Cole and Meadow**  
18           **plaintiffs, did you observe any stainless steel clamps**  
19           **failures?**

20           **A     In the Cole matter, yes, we did.**

21           **Q     And which home exhibited that failure?**

22           **A     I don't recall specifically which homes we**  
23           **saw cracking in the clamps. I know that certainly the**  
24           **Monica residence did, but I believe there were others**  
25           **as well.**

1           Q     And we can talk more specifically about the  
2     individual homeowners tomorrow. So explain to me, if  
3     you will, why you believe the use of this stainless  
4     steel that's specified here in F2098 is an improper  
5     choice of material for this product.

6           A     Well, it begins with the product design,  
7     because for stress corrosion cracking to occur, you  
8     have to have three things in existence simultaneously.  
9     You must have a vulnerable material that is susceptible  
10    to stress corrosion cracking in the intended  
11    environment. You must have sufficiently high tensile  
12    stress for stress corrosion cracking to occur. And you  
13    must have a detrimentally -- a detrimental chemical  
14    agent present in sufficient concentration for stress  
15    corrosion cracking to occur. If any one of those three  
16    things is not present, stress corrosion cracking can't  
17    occur.

18                   In this case, the design of the clamp renders  
19    the stress condition to be present. The tensile  
20    stresses in that clamp were approaching the tensile  
21    strength of the material as evidenced by necking that  
22    occurs in the clamp when it's properly installed. So  
23    we had certainly high levels of tensile stress. Stress  
24    corrosion cracking by definition occurs at stresses  
25    that are below the tensile strength for the material.

1 And we know that we had approached the yield strength,  
2 which is very, very near the tensile strength. So  
3 certainly stresses were sufficiently high to cause  
4 stress corrosion cracking.

5 We also know that we have a susceptible alloy  
6 through the selection of this clamp by choosing to  
7 offer a clamp that was made from an austenitic  
8 stainless steel, 304 stainless steel, from that alloy.  
9 They have provided a susceptible material. That  
10 material is known to be vulnerable to stress corrosion  
11 cracking in the presence of chlorides and tensile  
12 stress.

13 Remember, the standard is not a requirement  
14 that they make the clamps out of stainless steel. It's  
15 an option that was offered. It's up to the  
16 manufacturer to decide whether or not that is going to  
17 perform as they intend it to in their intended service  
18 environment.

19 Q So the simple fact that something may be  
20 susceptible to this type of failure doesn't necessarily  
21 mean that it is going to fail in practice.

22 Is that fair?

23 A It probably will in some cases and may not in  
24 all. The inherent underlying vulnerability, though,  
25 exists in every one of them at the time of sale. The

1 design defect is universally present at the time of  
2 sale.

3 Q Some will fail. Some will not.

4 A I didn't say "will." I said "may."

5 Q Some may fail. Some may not.

6 A It depends whether or not they are subjected  
7 to the chlorides that are required for the failure  
8 mechanism to occur. You have to have all three.  
9 Chlorides are very commonly found in plumbing systems.

10 Q And they're normally kept in the plumbing  
11 system; right?

12 A Not necessarily. Water is certainly one  
13 potential source for chlorides. It's not uncommon to  
14 have high levels of chlorides in a plumbing system. So  
15 if the water is allowed to escape the plumbing system  
16 for any reason, if that water is able to wet the clamp  
17 and evaporate, you leave behind concentrated chloride  
18 salts on the clamp. So that is certainly one potential  
19 source of chlorides. And it is a source for chlorides  
20 that frequently is introduced when the adjacent brass  
21 fitting corrodes due to dezincification as has happened  
22 in the Monica residence.

23 But it is by no means the only source of  
24 chlorides. In a typical residential plumbing  
25 application or construction application, concrete

1       curing accelerants, masonry materials, solder fluxes  
2       that are often used to sweat the copper connections  
3       that are used with these PEX plumbing systems will be  
4       very rich in chlorides. There are a variety of sources  
5       for chlorides that may come into contact with those  
6       clamps.

7           Q     Okay. And sitting here right now, you can't  
8       say with any degree of certainty how many of these  
9       clamps will fail or when they might fail?

10          A     Because we don't know when or where the  
11       chlorides will be introduced. That's correct.

12          Q     So without these three factors that would  
13       need to be present for stress corrosion cracking to  
14       exist, those particular clamps probably won't fail.

15                Is that fair?

16           MR. EDWARDS: Object to the form.

17           THE WITNESS: I do not believe that's fair to  
18       say.

19       BY MR. KUHLMAN:

20          Q     But in order for stress corrosion cracking to  
21       occur, the environment has to include a susceptible  
22       alloy, tensile stresses, and a deteriorating agent.

23           MR. EDWARDS: Object to the form. And you  
24       didn't specify your question was about clamps.

25

1 BY MR. KUHLMAN:

2 Q Clamps.

3 A Every plumbing system that contains NIBCO  
4 stainless steel clamps will have all three conditions  
5 present. Absolutely without doubt. Chlorides will be  
6 present in every plumbing installation. The question  
7 is whether or not they will accumulate on the clamp in  
8 sufficient concentration to induce a failure. The  
9 vulnerability in the clamp exists in every one of those  
10 homes. A susceptible alloy exists in every clamp sold  
11 by NIBCO. The tensile stresses will be sufficiently  
12 high in every installed clamp in the NIBCO plumbing  
13 system that's functioning.

14 The water contained within those plumbing  
15 systems will usually contain chlorides. I don't  
16 believe in my 16 years I have ever seen potable water  
17 that didn't contain some measurable amount of chlorides  
18 that can concentrate over time.

19 Certainly solder flux will have to be used in  
20 at least the hot water connection in these homes  
21 because you're not allowed to connect the PEX directly  
22 to the hot water heater. There should be sweat  
23 connections in most, if not all, of these homes. There  
24 will be other chloride-containing agents in all of  
25 these homes right down to the sweats that are on the

1 plumbers hands when they install these products. Most  
2 of us have chlorides on our hands.

3 So it would be almost unimaginable to  
4 conceive that any clamp could make its way into a  
5 plumbing system without encountering chlorides. And  
6 likely they will come from multiple sources.

7 Q Over the course of your various  
8 investigations involving NIBCO's PEX tubing products,  
9 how many failed clamps have you observed?

10 A I don't recall as we sit here today.

11 Q Is it --

12 A And you would need to define "failure," how  
13 you are asking the question.

14 Q How would you define the failure of a  
15 stainless steel clamp?

16 A I don't know that I would just define a  
17 failure in a stainless steel clamp. Usually when I get  
18 something, it has leaked and I'm asked to determine why  
19 it leaked.

20 Q Well, we can start there. If it's leaked,  
21 did it fail?

22 A Usually.

23 Q Is there a --

24 A Usually, from what I've seen.

25 Q Okay. And can there be a situation where a

1 leak will occur at a stainless steel clamp and there is  
2 not a failure of the clamp?

3 A Yes.

4 Q When would that be?

5 A If a plumber doesn't hit the sealing barb at  
6 all and it doesn't seal, certainly it's going to fail  
7 to seal and water's going to get out. In this case we  
8 looked for that or I looked for that specifically. I  
9 examined the pipes associated with the fittings that  
10 had stainless steel clamps in the Cole and Meadow class  
11 actions to determine if, in fact, the sealing barbs had  
12 left continuous witness marks at the interior surfaces  
13 of the pipes. I looked specifically for any evidence  
14 of a knicked barb or any type of a breach that would  
15 indicate improper sealing and I did not find any  
16 consistent trend that would indicate there was a  
17 problem with installation that had caused these clamps  
18 to crack.

19 Q So are you familiar with ASM?

20 A I am.

21 Q Are you a member of ASM?

22 A I am.

23 Q Have you reviewed the ASM International  
24 Metals Handbook at any time?

25 A I have certainly reviewed portions of that



1        **handbook. I don't know that I've read it cover to**  
2        **cover.**

3            Q        Are you familiar with the definition that the  
4        ASM metals handbook has provided for failure?

5            A        **Not off the top of my head, no.**

6            Q        At least one version of this book defines  
7        failure, the 9th edition, as "a general term used to  
8        imply that a part in service, one, has become  
9        completely inoperable; two, is still operable but is  
10       incapable of satisfactorily performing its intended  
11       function; or, three, has deteriorated seriously to the  
12       point that it has become unreliable or unsafe for  
13       continuous use."

14                    Would you agree with that definition of  
15       failure for the stainless steel clamps?

16            A        **I neither agree or disagree with it. I**  
17       **accept it as being what you've read.**

18            Q        Okay. Well, is that what you consider to be  
19       an industry-accepted definition of failure of a metal  
20       component in a plumbing system?

21            A        **It's probably a good definition for that**  
22       **application, yes. Certainly with respect to the**  
23       **clamps, I would say if you see any evidence of**  
24       **dezincification corrosion occurring, that would**  
25       **indicate a failure process has begun.**

1 Q Are you talking about on the fittings?

2 A I'm talking fittings or clamps, either one.  
3 If you see evidence of a failure mechanism at work, the  
4 failure process has begun.

5 Q So if there's evidence of, like, meringue on  
6 the clamp. You said dezincification in a stainless  
7 steel clamp, but maybe I misheard.

8 A I'm sorry. If I said that, I misspoke.  
9 Dezincification would apply to the brass fittings.  
10 Stress corrosion cracking applies to both for different  
11 reasons.

12 Q For any of these plaintiffs' homes, did you  
13 observe any fittings that failed as a result of stress  
14 corrosion cracking?

15 A I did.

16 Q Where was that?

17 A In the Monica residence and in the Medders  
18 residence.

19 Q Okay. We'll talk more about that tomorrow.

20 MR. EDWARDS: Can we take a minute off the  
21 record?

22 MR. KUHLMAN: Sure.

23 (Off the record 5:06 p.m. to 5:15 p.m.)

24 BY MR. KUHLMAN:

25 Q Okay. We're back on the record after a short

1 break. And I'd like to direct your attention to  
2 Exhibit 2. And if you could, please turn to page 12 of  
3 that document.

4 **A Oh, the first one.**

5 Q The first one.

6 **A Page 12?**

7 Q Mm-hmm.

8 **A Okay.**

9 Q Okay. And what I'd like to ask you first is  
10 with respect to the opinions that you generated in  
11 these cases, are the facts and data that you're relying  
12 on from these different cases that are outlined here  
13 included in the report in the appendices that you've  
14 provided us?

15 **A There are some things included in Appendix 12**  
16 **of the supplemental report, which is not this report,**  
17 **from other cases.**

18 Q Okay. With --

19 **A I'm sorry. There's also information**  
20 **contained in these reports related to -- certainly in**  
21 **the background section related to these cases. And**  
22 **there is also some discussion regarding the new pipes**  
23 **associated with the Christensen case that we**  
24 **evaluated -- I evaluated -- Paragon/Vanguard evaluated.**

25 Q I'm sorry. Could you say that again? The

1 last part about Christensen.

2 A In the Christensen matter in the report that  
3 was produced in this case that I authored in relation  
4 to the Christensen matter, we had analyzed two coils of  
5 new, never installed -- I say new. It was never  
6 installed -- NIBCO PEX pipe of the 1006 formulation and  
7 the 3308 formulation. And those are also discussed in  
8 some manner in these reports.

9 Q Okay. So with respect to what was considered  
10 from these cases, the facts and data that you rely upon  
11 are either included in this report or included in the  
12 supplemental report or the Appendix 12 to the  
13 supplemental report.

14 A Only representative photos are included in  
15 Appendix 12. So no, they're not completely discussed.  
16 What I have relied upon from those is what I've learned  
17 from them and how they have shaped my understanding of  
18 these pipes and what they look like when they fail and  
19 what this failure mechanism does to the pipe in  
20 response to bends or straight lengths and in different  
21 service environments. I've applied the collective  
22 knowledge of what I have learned regarding the behavior  
23 of NIBCO PEX 1006 pipe through all of these cases. It  
24 all helps form my knowledge base related to these NIBCO  
25 pipes.

1           Q     Okay. Did you produce any of the pictures or  
2     data or other work product that you generated in the  
3     Parsons case in this case?

4           A     Possibly. I don't recall.

5           Q     For this discussion, since we're kind of  
6     combining this, I'm talking about for Cole and Meadow  
7     together for these class reports. But did you produce  
8     the pictures or data or work product from the Parsons  
9     case as part of the class reports?

10          A     I don't recall what specifically was  
11     addressed from other cases. If you have a particular  
12     section you'd like to point me to, I'll be happy to  
13     review it with you.

14          Q     I'm just trying to understand if you have  
15     pictures that you think are showing specific things  
16     from these cases that haven't been produced to us.

17          A     I certainly have pictures related to these  
18     cases that have not been produced to you. Any photos  
19     that I would have put in Appendix 12 would have come  
20     from my reports that were produced in this matter.

21          Q     And that's what I'm getting at. Aside from  
22     the pictures that you're using in the report, are you  
23     planning on relying on any other pictures that we've  
24     never seen before to support your opinions in these  
25     cases?

1           A     I certainly may. I will rely upon the full  
2     breadth of my experience related to NIBCO pipe and I  
3     reserve the right to rely upon the full breadth of  
4     experience and to rely upon any documentation related  
5     to that experience.

6           Q     Okay. So do you still maintain your file for  
7     the Parsons matter?

8           A     I believe so, yes.

9           Q     Do you still have a file for the Molony  
10    matter?

11          A     I don't know with certainty. That, I don't  
12    know with certainty because we believed that to be CPI  
13    product. It may or may not still exist.

14          Q     Do you still have your file from the  
15    Christensen case?

16          A     Yes.

17          Q     At any time after the resolution of that  
18    case, did the attorneys ever ask you to return NIBCO's  
19    documents?

20          A     Not that I recall.

21          Q     So you've had those the whole time?

22          A     I have them in the building. They have not  
23    been accessed. They are boxed up and archived. They  
24    have not been referenced or accessed other than the  
25    things that have been produced in this case in relation

1       **to Christensen. Those I have reviewed and accessed.**

2           Q     Okay. But with respect to documents that  
3       were specifically produced in the Christensen case, you  
4       never sent those back to the attorneys.

5           A     **They were not sent back to the attorneys.**  
6       **They have been boxed up and archived and are in, you**  
7       **know, sealed boxes.**

8           Q     Okay. Do you still have a file for the Comer  
9       matter?

10          A     **I believe so.**

11          Q     And Mi Casita?

12          A     **Yes.**

13          Q     And is that case still ongoing?

14          A     **To my knowledge, it is.**

15          Q     Have you given a deposition in that case?

16          A     **No.**

17          Q     Is anything scheduled?

18          A     **Not that I'm aware of.**

19          Q     Have you prepared any reports?

20          A     **I did. It was produced in this case.**

21          Q     Okay. I thought I saw that. All right. And  
22       so with respect to the first case on here, Uponor v.  
23       Unique Industrial Product Company, what about that  
24       experience working on that matter are you relying on in  
25       this case?

1           **A     My knowledge and experience of brass fittings**  
2           **and the way that they behave.**

3           Q     Okay.

4           **A     ASTM F1807 brass insert fittings.**

5           Q     Okay. And what did you learn about those  
6           fittings with respect to during the course of that case  
7           and analysis that you believe is relevant to this case?

8           MR. EDWARDS: Object to the form.

9           THE WITNESS: In that particular case, I  
10          analyzed alloy chemistry extensively and the effect of  
11          alloy chemistry on the dezincification and stress  
12          corrosion cracking behavior of those insert fittings.

13         BY MR. KUHLMAN:

14          Q     Okay. And did you address the design of the  
15          fittings that would comply with F1807 and the alloys  
16          that are referenced in there that permit or at least  
17          indicate that a manufacturer can use an alloy with zinc  
18          levels in excess of 15 percent?

19          **A     I'm sorry. If there was a question in that,**  
20          **I missed it. Could you please restate that?**

21          Q     Did you form an opinion in that Uponor, Inc.,  
22          v. Unique Industrial Product Company case about the use  
23          of the alloys that are referenced in F1807 that  
24          possessed more than 15 percent zinc?

25          **A     I'm still not understanding your question.**



1           Q     Did you form an opinion with respect to the  
2     use of high zinc alloys in brass fittings as part of  
3     your work in the Uponor, Inc., v. Unique Industrial  
4     Product Company case?

5           A     **The fittings that I analyzed were high zinc**  
6     **brass fittings. Is that what you're asking me?**

7           Q     Well, no. I'm asking if you formed an  
8     opinion specifically with respect to the formulation of  
9     the alloys and specifically the ones that are called  
10    for in the standard and if those alloys that are called  
11    for in the standard are appropriate for use in those  
12    fittings?

13          A     **As I testified before, I don't recall the**  
14    **full breadth or scope of the issues in that case or the**  
15    **conclusions that I rendered in that case. What I do**  
16    **recall is that there were issues related to the**  
17    **material not conforming to the spec. But I don't know**  
18    **what other additional issues I may have addressed or**  
19    **what other additional opinions I may have offered. I**  
20    **don't recall.**

21                   **(Exhibit 13 Marked for Identification.)**

22    BY MR. KUHLMAN:

23          Q     All right. You referenced earlier an  
24    affidavit that was circulating around on the Internet.  
25    I'm going to hand you a document we will mark as

1 Exhibit 13. You've been handed a document marked as  
2 Exhibit 13.

3 First, is this an affidavit that you prepared  
4 as part of the Uponor, Inc., v. Unique Industrial  
5 Product Company case?

6 **A Yes.**

7 Q And is this your signature on page 6?

8 **A Yes.**

9 Q And it's a notarized signature. Do you have  
10 any reason to believe this is not a fair and accurate  
11 copy of your affidavit that was prepared in that case?

12 **A No.**

13 Q Okay. When was the last time you read this  
14 document?

15 **A I don't recall.**

16 Q All right. And you prepared this document  
17 when you were working for MTI; is that right?

18 **A Metallurgical Technologies, Incorporated,**  
19 **which is called MTI. Yes.**

20 Q And Uponor had retained MTI and you to  
21 prepare a report discussing certain brass fittings; is  
22 that right?

23 **A As I recall, yes.**

24 Q And those were brass fittings that were  
25 supposed to be made out of the same high zinc alloys

1       that are at issue in this case.

2               Is that your understanding?

3           **A     As I recall, that's correct.**

4           Q     And at the time you prepared --

5           **A     I'm sorry. One of the high zinc alloys.**  
6       **There are multiple specified in that standard.**

7           Q     Okay. So one of the high zinc alloys that's  
8       at issue here?

9           **A     Or more than one, but not necessarily all.**

10          Q     And at the time you prepared this report --  
11       well, let me ask you this: What was the -- what was  
12       the date? It looks like you signed this on March 30,  
13       2009. Does that sound right?

14          **A     That's the date it was notarized. So I**  
15       **assume that's correct.**

16          Q     Okay. And as of that time in 2009, you had  
17       worked for Uponor for five years and then you had  
18       worked for Metallurgical Technologies for around a year  
19       and a half. Is that fair?

20          **A     That's approximately correct, yes.**

21          Q     And at that time you'd conducted hundreds of  
22       failure analyses and generated reports discussing  
23       failures of metal and plastic products. Is that fair?

24          **A     I'm sure that it was hundreds, yes.**

25          Q     Okay. And one of the conclusions that you

1 reached in this case, if you could, just turn back to  
2 page 5. It's Number 14. You say "There was no reason  
3 to investigate the specific design of the brass  
4 fittings as that design has been successfully used in  
5 the plumbing industry for a number of years without  
6 incident."

7 **A Correct.**

8 Q Was that one of your opinions?

9 **A Yes. In this case it was specific to those**  
10 **fittings.**

11 Q And those are the same fittings that we're  
12 talking about here; right?

13 **A No.**

14 Q What's the difference?

15 **A These were Uponor's fittings that were sold**  
16 **to them by Unique Industrial Products not NIBCO's**  
17 **fittings that were manufactured and distributed from**  
18 **someone other than Unique Industrial Products. We**  
19 **cannot assume that, just because those fittings were**  
20 **specified to use the material from the same ASTM**  
21 **standard, that they were the same. They are not the**  
22 **same.**

23 Q So the fittings that you're referring to here  
24 in paragraph 14, those were brass fittings that were  
25 intended to be consistent with F1807; right?

1           **A     Yep.**

2           Q     And manufactured using a yellow brass that  
3     had in excess of 15 percent zinc; right?

4           **A     Correct.**

5           Q     And the NIBCO fittings at issue in this case  
6     are fittings intended for use in potable water systems  
7     that are manufactured to comply with F1807; right?

8           **A     Correct.**

9           Q     And were intended to be made with a alloy  
10    that contained zinc in excess of 15 percent?

11          **A     Correct. Those similarities exist but that**  
12    **does not mean that they were equal.**

13          Q     And that's -- but with respect to the design  
14    of those fittings, that would be outlined in F1807,  
15    would it not?

16          **A     Partially but not wholly.**

17          Q     How are they different?

18          **A     They could be different in a variety of ways.**  
19    **They could be different in wall thickness. They could**  
20    **be different in microstructure. They could be**  
21    **different in alloy compensation. They could be**  
22    **different in the degree of residual stress that exist**  
23    **in those fittings. They could be different in terms of**  
24    **the way they were manufactured, be it forged or**  
25    **machined or some combination thereof or cast. They**

1       could be different in the sense that one might have  
2       machining marks at the interior surface that another  
3       one doesn't have. There are a whole host of  
4       differences that could exist that could dramatically  
5       influence those failure mechanisms.

6           Q     Well, during the time you worked at Uponor  
7       and the time at Metallurgical Technologies, you  
8       conducted hundreds of failure analyses on different  
9       components and you looked at a whole bunch of these  
10      fittings and you also have looked at NIBCO fittings.

11                   How specifically are they different?

12           A     This case was not referencing anything other  
13      than the brass fittings at issue in this case. NIBCO's  
14      brass fittings are different from Uponor's brass  
15      fittings. Uponor's brass fittings, as Uponor  
16      controlled them and designed them, which often had  
17      tighter parameters for many Uponor products. They have  
18      tighter parameters than what is required by the specs.  
19      Uponor has higher quality standards in many cases than  
20      would be required simply by an ASTM standard.

21                   In this case when I say there was no reason  
22      to investigate the specific design of the brass  
23      fittings, I'm referring to the brass fittings at issue  
24      in this case, which in this instance Uponor had been  
25      selling for a number of years using their fixed

1 process, their fixed design, their fixed set of QA  
2 inspection parameters that held their microstructure  
3 and their different characteristics within what they  
4 deemed to be acceptable. And that design had performed  
5 successfully for them for a number of years. And  
6 suddenly they had -- I mean, suddenly, like in the span  
7 of two, three weeks -- they experienced a rash of  
8 failures. And those failures were specifically  
9 confined to a unique set of fittings within that design  
10 that had a distinctive marking.

11 As you see in Bullet 15 "Uponor was able to  
12 identify the brass fittings" -- I'm quoting here from  
13 Bullet 15 -- "Uponor was able to identify the brass  
14 fittings that were failing as having been supplied by  
15 Unique based upon the distinctive USPW markings on  
16 those fittings. No company other than Unique had  
17 supplied fittings to Uponor with the USPW marking and  
18 the failed fittings that were being returned by  
19 plumbers, wholesalers, and developers exhibited the  
20 distinctive USPW marking."

21 This was a situation involving a specific  
22 chemistry upset where the material did not conform to  
23 the specifications of that standard. That's not what  
24 we're experiencing here with NIBCO. Anytime you have a  
25 product that has performed beautifully and suddenly it

1 doesn't in a very uniquely defined set of conditions,  
2 that causes you to look first for what has changed in  
3 that fitting. And, in fact, in this case the change  
4 was very tangible and demonstrable and ultimately  
5 undisputed.

6 Q So the Uponor fittings that were being  
7 manufactured consistent with Uponor's quality control  
8 processes, et cetera, even though they had more than  
9 15 percent zinc in them performed beautifully for  
10 years --

11 A We talked about that --

12 Q -- is that right?

13 A We talked about that earlier. We talked  
14 about that earlier, how that was true for brass alloys.  
15 They used to perform well in many cases or most cases  
16 or in some cases, even all events for a manufacturer.  
17 The water --

18 Q As of 2009 when you prepared this affidavit,  
19 you were still saying that the design of those brass  
20 fittings was fine and had been successfully used in the  
21 plumbing industry for a number of years without  
22 incident; right?

23 A What I say is there was no reason to  
24 investigate the specific design of the brass fittings  
25 as that design had been successfully used in the



1 plumbing industry for a number of years without  
2 incident. That was true for Uponor's fittings. And in  
3 this case, we were trying to discover the root cause of  
4 why those fittings were suddenly failing, and they did  
5 address that.

6 Q Okay. So let me ask you this: You've looked  
7 at Uponor fittings that were manufactured to Uponor's  
8 quality control standards and you've looked at NIBCO  
9 fittings. What are the specific differences that lead  
10 you to believe that the specific design that's outlined  
11 in F1807 is good enough for Uponor and not good enough  
12 for NIBCO?

13 MR. EDWARDS: Object to the form.

14 THE WITNESS: I don't know that it is good  
15 enough for Uponor today. As I've said before, I  
16 recommended to Uponor you should not continue selling  
17 high zinc brass fittings into the plumbing  
18 applications. Water chemistries are changing. You  
19 should be using brass fittings with less than  
20 15 percent zinc.

21 The purpose of this investigation was to  
22 understand this rash of failures and the cause of the  
23 leaks. There's a big difference here. You're trying  
24 to make them the same when, in fact, they're not. The  
25 goal of this investigation was to determine the failure

1 mechanism that caused those fittings to leak because  
2 someone was going to resolve financial issues related  
3 to that.

4 BY MR. KUHLMAN:

5 Q And so it was in Uponor's best interest for  
6 the design of those fittings to be adequate --

7 A I don't know whether it was in their best  
8 interest or not.

9 Q -- so that Uponor wouldn't have to pay money?

10 A I have no idea if that was in their best  
11 interest or not. That was not my role. My role --

12 Q But you were hired by Uponor. Is that fair?

13 A I was hired by Uponor, yes. May I finish  
14 answering your question, please? You asked a question.  
15 I'd appreciate the opportunity to fully answer it.

16 MR. EDWARDS: You may answer.

17 THE WITNESS: In this role, my job as a  
18 scientist when we suddenly experience a rash of  
19 failures that we have not seen when I have been with  
20 the company for five years, I knew quite well how  
21 frequently we did or did not see products come back in  
22 from the field. And when I suddenly see a rash of  
23 something coming in that I'm not accustomed to seeing,  
24 my flag goes up in a big hurry so say something's going  
25 on. There's a problem here. What's going on?

1           The fact that that same design had been in  
2           service tells me as a scientist that's not where you  
3           better be focusing your attention if you want to get to  
4           the bottom of this quickly. You need to be looking for  
5           something that fits the failure scenario from a  
6           technical perspective.

7           It was apparent from what we were seeing,  
8           because the design had not changed, that a design issue  
9           was not likely at play here. And when we started  
10          looking at the materials, the cause of the failure  
11          became readily apparent. There was nonconforming  
12          chemistry and a very high level of residual stress from  
13          the machining of those fittings. And that was the  
14          issue. They had made some changes that I probably  
15          can't discuss in greater detail than what is presented  
16          here that had led to those issues. That was what was  
17          happening in this case.

18          That is a very different scenario from what  
19          we're addressing in this case. And we were dealing  
20          with stress corrosion cracking. Whereas in this case,  
21          we were primarily dealing with dezincification issues  
22          in these brass fittings with stress corrosion cracking  
23          thrown in.

24          BY MR. KUHLMAN:

25           Q       So when did you tell Uponor to stop selling

1 yellow brass?

2 **A I've said before I don't recall when, and I**  
3 **wouldn't be at liberty to disclose if I did.**

4 Q Was it before or after this affidavit when  
5 you said that the yellow brass fittings were performing  
6 successfully and there was no reason to even  
7 investigate the design as a potential cause of  
8 failures?

9 MR. EDWARDS: Object to the form of the  
10 question. It was asked and answered.

11 THE WITNESS: I don't recall when I told  
12 them. I don't recall when that was.

13 BY MR. KUHLMAN:

14 Q Do you think that -- well, okay. Well, you  
15 still haven't answered my original question that I  
16 asked a few minutes ago about the differences between  
17 these components.

18 **A I believe I did.**

19 Q You analyzed Uponor fittings that were  
20 manufactured to meet this F1807 standard and you  
21 analyzed NIBCO fittings that were manufactured and  
22 intended to meet this F1807 standard.

23 What specific differences have you seen in  
24 these two components?

25 **A First and foremost --**

1 MR. EDWARDS: Objection. Asked and answered.

2 THE WITNESS: First and foremost, we have no  
3 reason based on the evidence that exists so far in the  
4 NIBCO case to believe that there is a lot-specific  
5 issue, which was the case with Uponor. It was specific  
6 to fittings that were labeled USPW. We didn't have  
7 these issues in the fittings that were not labeled  
8 USPW. We were only seeing them in USPW fittings. That  
9 may have changed. In fact, I understand that it did  
10 ultimately change. I don't understand that directly  
11 from Uponor. I understand that from things I've been  
12 told. Knowing what we know now, I may render  
13 additional conclusions about that. But at that time,  
14 the issues that we were addressing, it was clear that  
15 this was not a design problem that we were dealing with  
16 for that case.

17 BY MR. KUHLMAN:

18 Q Were there any differences in the design of  
19 the two products, the NIBCO product versus the Uponor  
20 product?

21 A Yes.

22 Q What were the design differences between the  
23 Uponor F1807 yellow brass fittings and the NIBCO F1807  
24 yellow brass fittings you're talking about in this  
25 case?

1           A     I've already addressed that. There could be  
2 many differences in those fittings.

3           Q     But specifically what are they?

4           A     I've identified them already. There may be  
5 differences in wall thickness. There may be  
6 differences in microstructure. There may be  
7 differences in the method of manufacture, be it casting  
8 or forging or machining or some combination thereof.  
9 There may have been differences in surface finish at  
10 the interior of the fitting. There are a variety of  
11 differences that may have existed with those.

12          Q     I've heard you identify a lot of things that  
13 may be different but I haven't heard you say one thing  
14 that was different about the design of these two  
15 fittings, Uponor versus NIBCO.

16          A     I've given you as much information as I can  
17 give you sitting here today on that.

18          Q     So sitting here today you can't identify any  
19 specific difference that actually existed between the  
20 Uponor F1807 fittings that you said were successfully  
21 used in the plumbing industry and the NIBCO F1807  
22 fittings that you're saying are defective.

23          A     No.

24                   MR. EDWARDS: Object to the form.

25                   THE WITNESS: Because I did not analyze them

1 side by side and do a side-by-side comparison. What I  
2 can tell you is that the purpose of this investigation  
3 was to understand why that rash of failures was  
4 occurring. It was not to assess whether or not there  
5 was any type of underlying design deficiency in that  
6 product. That was not the purpose of this  
7 investigation. The purpose of this was to figure out  
8 why those specific leaks were occurring.

9 BY MR. KUHLMAN:

10 Q But you were specifically talking about F1807  
11 in paragraph 14.

12 A No. F1807 doesn't appear in paragraph 14.  
13 It says there was no reason to investigate the specific  
14 design of the brass fittings as that design has been  
15 successfully used in the plumbing industry for a number  
16 of years without incident.

17 The purpose of this investigation, as I've  
18 said several times, was to understand the cause for  
19 those leaks. It was not to assess the overall design.  
20 It was not to determine if there was any deficiency in  
21 the design of any type or to determine if there was any  
22 opportunity to make a better fitting. The purpose of  
23 that investigation was to determine why those leaks  
24 were occurring. And for that purpose in this  
25 investigation, we already had enough information, I

1       **believed and I still believe, to know that those leaks**  
2       **in those unique fittings were not a result of the**  
3       **product design. There was more to that story.**

4           Q       Because in your opinion, at that time in 2009  
5       there was no defect associated with the Uponor fitting  
6       that was manufactured to comply with Standard F1807  
7       using yellow brass with more than 15 percent zinc?

8           MR. EDWARDS: Object to the form. It's asked  
9       and answered. Mischaracterizes testimony.

10          THE WITNESS: That is not what I said. What  
11       you just stated is not what I said. You have  
12       misrepresented what I said before.

13       BY MR. KUHLMAN:

14          Q       You concluded based on your hundreds of  
15       investigations and years of experience that the  
16       specific design of the brass fitting didn't need to be  
17       considered as that design has been successfully used in  
18       the plumbing industry for a number of years without  
19       incident.

20          **A       No.**

21          MR. EDWARDS: Object to the form.

22          THE WITNESS: No. What I concluded was that  
23       a design issue did not cause that rash of failures  
24       because that exact design in fittings that were not  
25       labeled USPW had been used for many years without



1 incident. And no one in this case alleged design  
2 deficiency contributed. That was never a question in  
3 this case by any party. So it's a bit odd to me that  
4 you seem to want to make that suggestion when no one  
5 else involved in that case did. That was never a  
6 question in this case at least not that I recall.

7 BY MR. KUHLMAN:

8 Q But you concluded that there was no problem  
9 with the design in this case.

10 A I concluded there was no need to assess the  
11 design to determine the cause of failure for those  
12 leaks occurring in fittings labeled USPW. Please stop  
13 mischaracterizing what I've said. I've answered you  
14 many times. Please stop mischaracterizing it. If you  
15 have another question that you need me to answer to  
16 clarify it, I'm happy to try.

17 MR. KUHLMAN: Well, it's 5:51. It's  
18 20 minutes past our closing time here at the office.  
19 Let's break until tomorrow.

20 (Signature reserved.)

21 (Deposition adjourned at 5:51 p.m.)

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CERTIFICATE OF REPORTER

STATE OF NORTH CAROLINA           )  
COUNTY OF MECKLENBURG           )

I, MEREDITH R. SCHRAMEK, the officer before whom  
the foregoing deposition was taken, do hereby certify  
that the witness whose testimony appears in the  
foregoing deposition was duly sworn by me; that the  
testimony of said witness was taken by me to the best  
of my ability and thereafter reduced to typewriting  
under my direction; that I am neither counsel for,  
related to, nor employed by any of the parties to the  
action in which this deposition was taken, and further  
that I am not a relative or employee of any attorney or  
counsel employed by the parties thereto, nor  
financially or otherwise interested in the outcome of  
the action.

This, the 31st day of May, 2017.

---

MEREDITH R. SCHRAMEK  
Notary Public in and for  
County of Mecklenburg  
State of North Carolina  
Notary Number 200814200186

WITNESS'S CERTIFICATE

I, CYNTHIA SMITH, do hereby certify  
that I have read and understand the foregoing  
transcript and believe it to be a true, accurate, and  
complete transcript of my testimony, subject to  
the attached list of changes, if any.

\_\_\_\_\_  
CYNTHIA SMITH

This deposition was signed in my presence by  
\_\_\_\_\_, on the \_\_\_\_\_ day of  
\_\_\_\_\_, 2017.

\_\_\_\_\_  
Notary Public

My commission expires:

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IN THE UNITED STATES DISTRICT COURT  
FOR THE MIDDLE DISTRICT OF TENNESSEE  
NASHVILLE DIVISION

CHAD MEADOW, JOHN AND SUSAN, )  
PLISKO AND KENNETH MCLAUGHLIN ) Case No. 3:15-cv-1124  
INDIVIDUALLY AND ON BEHALF OF )  
ALL OTHERS SIMILARLY SITUATED, )  
)  
PLAINTIFFS, )  
)  
v )  
)  
NIBCO, INC., )  
)  
DEFENDANT. )

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UNITED STATES DISTRICT COURT  
DISTRICT OF NEW JERSEY

KIMBERLY COLE, ALAN COLE, JAMES )  
MONICA, LINDA BOYD, MICHAEL ) Case No. 13-cv-07871  
MCMAHON, RAY SMINKEY, JAMES )  
MEDDERS, JUDY MEDDERS, ROBERT )  
PEPERNO, SARAH PEPERNO, AND )  
KELLY MCCOY, ON BEHALF OF )  
THEMSELVES AND ALL OTHERS )  
SIMILARLY SITUATED, )  
)  
PLAINTIFFS, )  
)  
v )  
)  
NIBCO, INC., )  
)  
DEFENDANT. )

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DEPOSITION OF CYNTHIA SMITH  
VOLUME II  
(TAKEN BY DEFENDANT)  
CHARLOTTE, NORTH CAROLINA  
MAY 25, 2017

REPORTED BY: Mary L. Labonte  
Registered Professional Reporter  
Notary Public

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1                   On May 25, 2017, continuing at 8:39 a.m., the  
2                   deposition of CYNTHIA SMITH was taken pursuant to  
3                   notice on behalf of the Defendants, at the law offices  
4                   of Robinson Bradshaw, 101 North Tryon Street, Suite  
5                   1900, Charlotte, North Carolina

6                   CYNTHIA SMITH,  
7                   having been first duly sworn, was examined and  
8                   testified as follows:

9                   EXAMINATION

10                  BY MR. KUHLMAN:

11                  Q.   Good morning, Ms. Smith.

12                  **A.   Good morning.**

13                  Q.   We are here for the continuation of your  
14                  deposition that we got started yesterday. I'd like to  
15                  start by doing this, I'm going to mark this document  
16                  here as Exhibit 14. This is a copy of the notice of  
17                  the deposition for the Cole case. And based on  
18                  discussions yesterday, we're going to actually be  
19                  using both portions of the depositions for both cases  
20                  and so we're going to use both captions on the  
21                  deposition when it ends up coming out. You understand  
22                  that. Right?

23                  **A.   I do.**

24                  Q.   Okay. Super.

25                  (Smith Exhibit Number 14 was marked for

1 identification.)

2 Q. Okay. And next I'm going to hand you a  
3 document that we will mark as Exhibit 15 and ask you  
4 to take a quick look at that.

5 (Smith Exhibit Number 15 was marked for  
6 identification.)

7 Q. And what is Exhibit 15?

8 A. It appears to be a portion of my report  
9 number 2013115 related to the analysis of NIBCO PEX  
10 plumbing products associated with the Cole class  
11 action.

12 Q. Okay. And you say a portion because some of  
13 the contents of the appendices have not been printed  
14 out and included with the copy that you received. Is  
15 that right?

16 A. Most of the appendices have not been printed  
17 out or included with the report.

18 Q. And instead of being copied and printed out,  
19 it would say something along the lines of produced in  
20 digital format. Right?

21 A. The cover page for the appendix may say  
22 produced in digital format. When the actual report  
23 was produced, they were in fact produced with the  
24 report.

25 Q. In digital form. Right?

1           A. They were produced in digital form on the  
2           FTP site as was the report.

3           Q. Okay. So with respect to what is actually  
4           here, which is the entirety of the document, like a  
5           single document that was labeled as the report, are  
6           you claiming that there's any pages missing or that  
7           this is not an accurate copy of the report?

8           A. Yes. It's clearly missing portions of the  
9           report.

10          Q. Okay.

11          A. The report was produced in its entirety in  
12          digital format on an FTP site, text and photos from  
13          the appendices and documents associated with the  
14          appendices. And what you have given me is the text  
15          portion only, without any of the appendices that were  
16          produced simultaneously in digital format with the  
17          digital report.

18          Q. So is this a full and accurate copy of the  
19          text of your report?

20          A. To the extent that I can tell by flipping  
21          through it, it appears to be a complete portion of the  
22          text.

23          Q. Okay. And if we include the digital files  
24          that encompassed the appendices, there would be a  
25          whole copy. Right?



1                   A.   If those were present --

2                   Q.   Right.

3                   A.   -- it would be a complete copy.

4                   Q.   Okay.   Yesterday during your deposition we  
5                   talked about an exhibit and it was marked as  
6                   Exhibit 3.   It was your first supplemental expert  
7                   report that was prepared in the Meadow case.   Have you  
8                   started preparing a supplemental expert report for the  
9                   Cole case?

10                  A.   I have not been asked to prepare a  
11                  supplemental report for the Cole case as yet.

12                  Q.   Okay.   Have you started working on one?

13                  A.   I have not on paper.   Certainly I have  
14                  thoughts in my head related to things that I would  
15                  likely address in the supplemental report if need be.

16                  Q.   Okay.   If you were -- are you planning on  
17                  doing additional tests on any samples that you have in  
18                  your possession?

19                  A.   I reserve the right to.   I don't have a plan  
20                  for anything at this point because I don't know where  
21                  this case is going to go.   My plan would be to respond  
22                  as needed based on the evidence that exists and to do  
23                  whatever additional work may be required to address  
24                  the issues that arise.

25                  Q.   Nothing is currently scheduled or planned to

1           happen but if someone asks you to do something, you  
2           would probably do it?

3                   **A. If this case were to move forward, there are**  
4           **probably some additional tests that I would recommend**  
5           **that we consider doing to respond to some assertions**  
6           **in ESI's report.**

7                   Q. What additional tests would you recommend  
8           that the plaintiffs do in this case to respond to the  
9           Cole report?

10                   **A. For example I would probably section the**  
11           **burst test samples and see what those samples show**  
12           **with the interior surface of the pipe. That would be**  
13           **one example.**

14                   Q. What would you be looking for?

15                   **A. Whatever they show.**

16                   Q. Are there any standards that address what  
17           the interior of a burst test sample looks like? What  
18           specifically would you be looking for?

19                   **A. I would be looking to see what the samples**  
20           **show us. I don't know what is going to be present**  
21           **until we open them up and look. I don't know what**  
22           **they will show.**

23                   Q. Would you be looking to see if they showed  
24           you anything in particular?

25                   **A. Not necessarily. I would be looking to see**

1           what they show and how they look and what their  
2           condition is.

3           Q.   What features would you be looking to see if  
4           they exhibited?

5           A.   I would look at the entire interior surface.  
6           I would look at the surface topography. I would look  
7           at the surface color. I would look for any evidence  
8           of cracking; if so, what those cracks looked like. I  
9           would look for any evidence of any rupture that's  
10          occurring in that sample. I would look for any manner  
11          of things as we have in all the other pipes we  
12          examined.

13          I would look to see what they show, do they  
14          show any extrusion defects, are there any anomalies  
15          here. I would be open to whatever they show.

16          Q.   If you could please turn back to page 92 of  
17          your report.

18          A.   Which report are you referring to?

19          Q.   I'm sorry. You're right. The Cole report,  
20          Exhibit 15.

21          A.   Okay.

22          Q.   Okay. Are these your ultimate conclusions  
23          that you reached as part of your investigation in the  
24          Cole case?

25          A.   We are looking at a section of the report

1           **entitled conclusions so this would be a summary of the**  
2           **overarching conclusions for this case.**

3           Q. And your first conclusion here that's marked  
4           as A states all CPI and NIBCO PEX 1006 plumbing pipe  
5           manufactured on or after May 15, 2006 and possibly  
6           earlier is inherently defective due to improper  
7           material selection and defective manufacturing design,  
8           which renders the pipe insufficiently stabilized for  
9           the intended application. Let's start with that part  
10          first. Did I read that part of your conclusion  
11          correctly?

12          **A. You did.**

13          Q. Does that remain your conclusion?

14          **A. Yes.**

15          Q. And is that the same conclusion that you  
16          reached in the Meadow case?

17          **A. Essentially. It may be worded slightly**  
18          **differently perhaps, but essentially yes.**

19          Q. Okay. So wording issues aside, the opinions  
20          that you reached in the Meadow case are essentially  
21          the same as the opinions you reached in the Cole case?

22          **A. Yes. They were investigated simultaneously**  
23          **and in my mind have been treated jointly.**

24          Q. And your opinion continues these pipes may  
25          fail in as little as one to two years after

1 installation and typically experience recurrent fine  
2 leaks until the plumbing system is replaced. Is that  
3 also one of your opinions from both of these cases?

4 A. Yes.

5 (There was an interruption in the  
6 proceedings.)

7 MR. KUHLMAN: I'm sorry. I'm turning my  
8 ringer off here.

9 Q. Okay. So I'd like to ask you this: How  
10 many samples have you inspected that failed in as  
11 little as one to two years after installation?

12 A. I would have to review the specific data to  
13 know an exact number. I know for example the McCoy  
14 residence experienced a failure after as little as one  
15 year and the Cole residence also experienced a failure  
16 in under two years. There were other homes as well  
17 that experienced failures in that two-year timeframe.  
18 McLaughlin from the Meadow case I believe also  
19 reported experiencing failures in that two- to  
20 two-and-a-half-year timeframe. There's a table in  
21 this report that summarizes that data if you'd like us  
22 to go through that in detail.

23 Q. Okay. Where is that?

24 A. I'm looking. If you could turn to page four  
25 please.

1 Q. Okay.

2 A. Specific to this case, the Coles reported  
3 their first leak occurred approximately one-and-a-half  
4 years after installation. The McCoy residence  
5 reported a leak that occurred approximately one year  
6 after installation. The Medders residence experienced  
7 leaks in their fittings after less than two years,  
8 1.8 years roughly, as did James Monica, roughly two  
9 years to initial leaks in their brass fittings and  
10 stainless steel clamps. This data does not include  
11 information from the Meadow case. We would have to  
12 refer to the Meadow report for that.

13 Q. Did you have an opportunity to review any of  
14 the samples from those earliest leaks that are  
15 referenced on table one?

16 A. I don't recall off the top of my head the  
17 dates of the leaks for the samples that I saw.

18 Q. Okay. Okay. So circling back to page 92 if  
19 you could go back to that for me. If you could please  
20 describe for me the methodology that you followed to  
21 reach your conclusion that the NIBCO 1006 plumbing  
22 pipe is inherently defective due to improper material  
23 selection and the defective manufacturing design,  
24 which renders the pipe insufficiently stabilized for  
25 the intended application.

1           A. The methodology has been described in detail  
2           in the reports that have been produced in this case  
3           and in the Meadow case. But as a summary, we could  
4           say that the methodology has centered around  
5           evaluation of numerous pipes in these cases as well as  
6           from other cases where pipes failed in a similar  
7           manner exhibiting the same NIBCO 1006 pipe  
8           formulation. And the collective evaluation of all of  
9           the pipes that I have examined to date that have  
10          failed during service NIBCO's pipes have demonstrated  
11          that they're all failing in a very similar manner.

12                 I performed home inspections in relation to  
13          these cases and in other cases where we've gone in and  
14          looked at the temperature of the systems, we've looked  
15          at the pressure of the systems, we've looked at the  
16          water chemistry, we've looked at the manner of  
17          installation, we've looked in the laboratory for any  
18          evidence of UV degradation.

19                 We have examined the construction of these  
20          pipes. We have looked at the material composition of  
21          the pipes. We have measured the degree of oxidation  
22          that the interior surface of the pipes as well as at  
23          midwall and at the OD surface. We have evaluated the  
24          degree of residual stabilization in these pipes. We  
25          have considered the possibility that deposits from the

1 water did or did not influence the failure of these  
2 pipes. We have evaluated that through energy  
3 dispersive x-ray spectroscopy.

4 And through all of that, coupled with a  
5 review of I forget now the number of pages of  
6 documents in the volume of documents, but it was  
7 upwards I believe of about 40- to 50,000 pages of  
8 documents or more related to internal communications  
9 with NIBCO reports that were produced by Jana  
10 Laboratories and so forth, all of that led to the  
11 basis for these opinions.

12 All of that information was considered and  
13 it has shown that these pipes, no matter where they're  
14 installed, no matter what state they're in, no matter  
15 who the municipal purveyor is or even if it's well  
16 water that was not treated by a municipal water  
17 purveyor, whether it's a straight section or a bent  
18 section of pipe, no matter what plumber installed it,  
19 no matter what the temperature was, whether it was hot  
20 water or cold water or whether there was a recirc  
21 system or not, whether there was elevated pressure or  
22 not, they're all failing in a virtually identical  
23 manner both within this case and the Meadow case and  
24 in comparison to other cases that I have been involved  
25 with around the United States. That has been true for



1           pipes that have been installed from Pennsylvania to  
2           the Baja Peninsula of Mexico.

3           Q. So what test data are you relying on to  
4           support your conclusion that the NIBCO 1006 plumbing  
5           pipe is insufficiently stabilized for its intended  
6           application?

7           A. I'm relying on all of the test data  
8           presented in these reports as well as the test data  
9           presented in others reports that I prepared in other  
10          cases as well as test data that has been prepared by  
11          Jana Laboratories on behalf of NIBCO and NIBCO'S own  
12          internal testing.

13          Q. Let me be some more specific. What tests  
14          are you relying on data that was -- from which test --  
15          no, let's not do it that way either. You obtained  
16          data from various sources regarding testing that you  
17          performed. Is that fair?

18                 MR. SHAMBERG: Object to form.

19                 MR. KUHLMAN: Thank you.

20          A. No, I couldn't agree with that.

21          Q. Okay. What actual testing procedures are  
22          you relying on to support your opinion that NIBCO's  
23          1006 plumbing pipe is insufficiently stabilized for  
24          its intended application?

25                 MR. SHAMBERG: Objection. Vague.

1                   You can answer.

2                   **A. I believe I just answered that question. If**  
3                   **there are specific places in this report you would**  
4                   **like to refer to me, I'm happy to try to answer**  
5                   **specific questions, but I believe I've already**  
6                   **answered the question that you asked.**

7                   Q. I'm asking you specifically to identify the  
8                   tests that you performed that provided you with data  
9                   that you're relying on to support your conclusion that  
10                  NIBCO PEX 1006 plumbing pipe is insufficiently  
11                  stabilized for its intended application.

12                  **A. Okay. I performed site inspections in a**  
13                  **variety of homes.**

14                  Q. Okay. Let's stop there.

15                  **A. Okay.**

16                  Q. Let's do tests. I'm asking specific tests.

17                  **A. I tested water in those homes.**

18                  Q. The tests. Okay. So water tests?

19                  **A. I also tested the pH of the water. We**  
20                  **examined the temperature of the system. We tested the**  
21                  **pressure of the system in those homes. We visually**  
22                  **inspected the plumbing systems in those homes. We may**  
23                  **have even performed some dimensional inspections at**  
24                  **times in some of these homes.**

25                  I don't recall specifically exactly what we

1 did for the Christianson home inspections or at Mi  
2 Casita, but certainly those inspections were performed  
3 similarly, where we also evaluated pressure. In the  
4 Mi Casita case, we used data loggers to monitor  
5 pressure over time. In other cases we did a single  
6 point pressure measurement. So all of that site  
7 testing was considered in my opinions.

8 We also performed laboratory testing where  
9 we performed visual inspections of the pipes to  
10 determine that the macroscopic appearance was  
11 consistent with oxidative degradation. I performed  
12 stereo microscopy to determine that the interior  
13 surface appearance of the pipes was consistent with  
14 oxidative degradation and to determine that the  
15 appearance and morphology and orientation of the  
16 cracks that were observed within those pipes was  
17 consistent with oxidative degradation.

18 I further performed stereo microscopy to  
19 identify crazing at the interior surfaces of those  
20 pipes, which was consistent with oxidative  
21 degradation, and to evaluate the presence or absence  
22 of any other type of anomalous conditions that may  
23 have influenced those cracks be it some type of  
24 mechanical damage or some type of crimp or rub as ESI  
25 often asserts.

1                   The pipes were examined for all of that to  
2                   determine if those were contributing factors. We also  
3                   evaluated the pipes by Fourier, F-o-u-r-i-e-r,  
4                   transform infrared spectrometry to measure the degree  
5                   of oxidation at the interior surface of the pipe and  
6                   to map that around the pipe circumference and  
7                   throughout the pipe wall.

8                   We also evaluated samples at the interior  
9                   surface of select pipe, samples from many different  
10                  cases, to look at the degree of -- or I'm sorry, the  
11                  loss of stabilization at the interior surface of the  
12                  pipe at midwall and at the outer diameter surface at  
13                  90-degree intervals around the pipe.

14                 We used scanning electron microscopy to  
15                 evaluate the interior surface appearance of the pipes  
16                 to confirm that they were also consistent with  
17                 oxidative degradation. We used energy dispersive  
18                 x-ray spectroscopy to evaluate the interior surface of  
19                 the pipes for the presence of chlorine or oxygen or  
20                 any other surface deposits that may have been present  
21                 to characterize those. Those results were consistent  
22                 with oxidative degradation of the PEX material.

23                 We also exposed fracture surfaces from the  
24                 incident pipes from this case and other cases and  
25                 examined those fracture surfaces with the stereo

1       microscope and with a scanning electron microscope to  
2       see if the fracture features in the initiation region  
3       were indicative of and consistent with cracking from  
4       oxidative degradation followed by progression due to  
5       creep rupture we would expect. Indeed they were in  
6       each and every case we evaluated.

7               We also used those exposed fracture surfaces  
8       to further assess the depth of oxidative damage to  
9       those pipes. Oxidative damage was at least 100 -- I  
10      believe it was a 100 microns. We'll have to verify  
11      that with the photos when those are made available,  
12      but they were used for that purpose.

13             All of those results were again found to be  
14      consistent with oxidative degradation in the pipes in  
15      the absence of any other contributing factor. We then  
16      married all of that information and compared that to  
17      test data that had been generated by NIBCO and by Jana  
18      Laboratories and other agencies looking at their pipe  
19      as manufactured before it had ever been installed in  
20      service or ever been in contact with potable water or  
21      pressure or temperature.

22             They had assessed, they being Jana, the  
23      oxidative stability as measured by differential  
24      scanning calorimetry for oxidation induction time.  
25      Those test results showed similar patterns to what we

1           had observed in field-return pipe. We also evaluated  
2           test reports that were generated by Jana Laboratories  
3           and by NIBCO evaluating field-return product where  
4           they had also done testing and concluded that those  
5           pipes had failed due to oxidative degradation.

6                       We've also reviewed published literature  
7           documenting the features of --

8                       Q. Okay. I'm asking you specifically about  
9           tests.

10                      MR. SHAMBERG: Kevin, she's finishing her  
11           answer. Let her finish her answer.

12                      Q. All right.

13                      A. We've also reviewed published literature  
14           documenting chlorine resistance tests that was  
15           performed on crosslinked polyethylene pipes to show  
16           what those pipes look like when they fail in a  
17           chlorine resistance test due to oxidative degradation  
18           caused by chlorine exposure and we have compared those  
19           photos to what we have seen in the incident samples.  
20           They were found to be virtually indistinguishable.

21                      We also performed cross-sections through the  
22           incident pipes to look for evidence of cracks  
23           penetrating into the pipe wall around the pipe  
24           circumference. That testing revealed again consistent  
25           damage consistent with oxidative degradation with

1 cracks penetrating more than 50 percent through the  
2 wall of the pipe in areas that had not yet leaked.  
3 That's probably a pretty good overview of the testing  
4 that was performed, though I can't, sitting here  
5 recalling this off the top of my head, ensure that I  
6 haven't left something out.

7 Dimensional testing was also performed to  
8 determine what the effects of pressure, if any, may  
9 have been on those pipes.

10 Q. The testing you performed, was any of that  
11 testing done on unused NIBCO pipe for this case?

12 A. We did evaluate unused NIBCO pipe in  
13 association with the Christianson matter and we relied  
14 upon that data in this case as documented in each of  
15 my reports.

16 Q. What specific data did you obtain when you  
17 analyzed unused pipe in the Christianson case that you  
18 relied on in this case?

19 A. We analyzed unused pipe in the 1006  
20 formulation and the 2208 formulation, NIBCO pipe that  
21 had never been installed. We analyzed those pipes by  
22 at least -- we'll have to pull those reports and see.  
23 We analyzed them by oxidation induction time testing  
24 through differential scanning calorimetry and I  
25 believe also by Fourier transform infrared

1       spectrometry. We performed other tests on those pipes  
2       as well, but those were -- those were the ones that  
3       were related to oxidative damage or lack thereof.

4               Q. Okay. So with respect to the tubing  
5       industry, there's a standard that outlines what is  
6       required for PEX tubing, is there not?

7               A. There are --

8               MR. SHAMBERG: Object to form.

9               A. -- standards related to PEX tubing.

10              Q. All right. Let's hand you a document we'll  
11       mark as Exhibit 16. Sorry. I started to write on  
12       that one. Use this one.

13                       (Smith Exhibit Number 16 was marked for  
14       identification.)

15              Q. Okay, what is Exhibit 16?

16              A. It is ASTM standard designation F876-09,  
17       standard specification for crosslinked polyethylene,  
18       parentheses, PEX, P-E-X, tubing.

19              Q. Okay. And this specification is under the  
20       jurisdiction of ASTM committee F17 on plastic piping  
21       systems. Is that right?

22              A. Yes.

23              Q. And you're on that committee. Is that  
24       right?

25              A. Yes.



1           Q. And in order for a manufacturer to obtain  
2           certification that its piping is consistent with F876,  
3           it has to demonstrate to the certifying agency that  
4           the tubing it's manufacturing passes a number of  
5           tests. Is that fair?

6           **A. That it conforms to a number of test**  
7           **requirements, yes.**

8           Q. All right. And so a manufacturer would need  
9           to establish that the tubing has a minimum density of  
10          .926 mg over meter square. What is that?

11          **A. Do you have a specific place you would like**  
12          **to point me to?**

13          Q. 6.4 if you would like to look back at it.  
14          Why don't you start at the top. A tubing manufacturer  
15          would need to demonstrate to the certifying agency  
16          that it met the requirements for 6.1 for workmanship?  
17          Is that fair?

18          **A. The standard states that it must meet the**  
19          **requirements for workmanship, which states the tubing**  
20          **shall be homogenous throughout and free of visible**  
21          **cracks, holes, foreign inclusions or other defects.**  
22          **The pipe shall be as uniform as commercially**  
23          **practicable in color, opacity, density and other**  
24          **physical properties.**

25          Q. And moving through the list, essentially a

1 manufacturer would need to demonstrate to the  
2 certifying agency that the tubing it's manufacturing  
3 meets all the other tests here that are listed in  
4 section 6 requirements. Is that fair?

5 **A. That is -- it requires that it meet these**  
6 **requirements, yes. The standard states it must meet**  
7 **these requirements.**

8 Q. Okay. And you would agree with me that CPI  
9 obtained certification from NSF that the 1006 tubing  
10 it was manufacturing that ultimately became the 1006  
11 tubing that NIBCO began manufacturing met the  
12 requirements of F876?

13 MR. SHAMBERG: Object to form.

14 **A. I would not agree with that, no.**

15 Q. Okay. CPI submitted its tubing samples to  
16 NSF for certification, the 1006 tubing. Right?

17 **A. That is my understanding.**

18 Q. And NSF performs tests on that tubing to  
19 confirm that the tubing samples that are provided meet  
20 the requirements of the standard?

21 MR. SHAMBERG: Object to form.

22 Q. Are we still on the same page there?

23 **A. NSF performs some testing. Some other tests**  
24 **they don't perform.**

25 Q. Okay.

1                   **A. They would maybe rely on testing performed**  
2                   **by someone else.**

3                   Q. That's fair. NSF can rely on data that they  
4                   generate or data that is generated by an accredited  
5                   lab that is approved by them?

6                   **A. A lab that is approved by them.**

7                   Q. Right.

8                   **A. They may or may not require that lab to be**  
9                   **accredited.**

10                  Q. Fair enough. So in order to obtain  
11                  certification, a manufacturer needs to demonstrate to  
12                  NSF that it meets these requirements. Are we on the  
13                  same page so far?

14                  **A. Yes.**

15                  Q. All right. When I'm talking about NIBCO's  
16                  1006 tubing or CPI's 1006 tubing, I'm specifically  
17                  referring to the tubing that was manufactured by NIBCO  
18                  as 1006 tubing. Okay?

19                  **A. When you say CPI, you mean NIBCO?**

20                  Q. No, that's not what I'm saying.

21                  **A. Okay.**

22                  Q. What I'm saying is if I'm referring to 1006  
23                  tubing for this case, I'm referring to the formulation  
24                  that was used by CPI and then later used by NIBCO as  
25                  NIBCO's 1006 tubing.

1                   **A. Okay.**

2                   Q. So CPI submitted a 1006 tubing sample or a  
3                   sample that it wanted to have certified by NSF to meet  
4                   the standards of F876. NSF ultimately certified that  
5                   product to meet the requirements of F876, did it not?

6                   MR. SHAMBERG: Object to form.

7                   **A. There were a variety of tests that would**  
8                   **have been performed at different times.**

9                   Q. Right.

10                  **A. This was not a sample that got submitted so**  
11                  **I have to disagree with you a little bit in the way**  
12                  **that you're presenting that scenario.**

13                  Q. Okay. Let me do this, NSF certified the  
14                  1006 tubing?

15                  **A. Yes.**

16                  Q. And it certified the 1006 tubing indicating  
17                  that as far as it was concerned, the tubing met the  
18                  requirements of F876?

19                  **A. That is not wholly accurate.**

20                  Q. Why not?

21                  **A. Well, for example F876, the version of the**  
22                  **standard that you provided me, requires that the pipe**  
23                  **conform to chlorine resistance testing. NSF actually**  
24                  **gave a provisional certification related to NIBCO's**  
25                  **red pipe and orange pipe when it relates to chlorine**

1 resistance testing because those pipes had actually  
2 failed the chlorine resistance testing.

3 There were other colors of pipes,  
4 specifically terra cotta, that was subjected to a full  
5 scope chlorine resistance test that did pass. There  
6 were some other colors that also passed with a more  
7 limited scope of testing, although in the case of blue  
8 pipe, it barely passed, and the red and the orange had  
9 failed.

10 So they gave what's called a provisional  
11 listing, which means we're going to go ahead and let  
12 you sell that pipe, but you're kind of on notice  
13 there's an issue here and we're going to retest that  
14 pipe in three years and if it doesn't pass, you will  
15 lose that certification for those products.

16 And that repeat test did not happen. As of  
17 March of 2009, which was past that three-year period,  
18 that test still had not happened. NIBCO expected it  
19 to happen any moment and was very concerned that they  
20 would lose that certification when that retest  
21 happened.

22 There's a Jana document that was published  
23 in I believe March of 2009 that lays out the complete  
24 history of the chlorine testing. I would be happy to  
25 walk through that in greater detail if you have a copy

1           of that document with you.

2           Q. Are you relying on that history as part of  
3 your opinion?

4           A. Of course.

5           Q. Okay. So where did you hear that a  
6 provisional listing was offered by NSF?

7           A. It is in the Jana report.

8           Q. All right. And isn't it true that all --

9           A. Among other places.

10          Q. -- PEX tubing samples that are certified to  
11 meet F2023 come up for an audit in three years?

12          A. I would have to look back at the frequency.  
13 I believe the frequency has changed through the years  
14 as NSF has changed their policies.

15          Q. Okay.

16          A. The fact of the matter is that audit did not  
17 happen.

18          Q. Well, ultimately that audit did happen, did  
19 it not?

20          A. There was another set of testing I believe  
21 that was done later. However, that three-year audit  
22 did not happen within the three-year period. My point  
23 here is you are misrepresenting the situation when you  
24 assert that the NIBCO pipe wholly met all requirements  
25 of the standard. That is not actually accurate or

1 correct.

2 There are certain NIBCO pipes that we know  
3 did not pass the chlorine resistance testing although  
4 they did achieve certification. So we must be very  
5 careful in separating product performance from  
6 certification. Having a product certified does not  
7 universally tell you how products will perform, as  
8 demonstrated by the differences in the chlorine  
9 resistance test.

10 In one particular test not involving the  
11 resin associated with these pipes, using Equistar  
12 resin, terra cotta pipe exhibited many, many, many  
13 years longer predicted life in the chlorine test. If  
14 you have that Jana report where we can look at  
15 specific numbers, you will see that the same trends,  
16 although at slightly different values, was observed.

17 When the specific resin at issue in this  
18 case was used, the terra cotta pipe exhibited  
19 significantly more life and passed the test, whereas  
20 the orange and red pipe did not pass the test.

21 Q. So the terra cotta tubing that was submitted  
22 for a complete battery of F2023 tests by CPI met the  
23 minimum requirements of F2023 according to NSF. Fair?

24 MR. SHAMBERG: Object to form.

25 A. It passed the chlorine resistance test that

1           **was performed by Jana Laboratories.**

2           Q. So the terra cotta tubing passed the test,  
3           the chlorine resistance test, according to the report  
4           that you've seen. Fair?

5           **A. At least prior to 2009. Do you have a copy**  
6           **of that report that we could reference?**

7           Q. We'll get to that.

8           **A. I prefer not to rely on memory for these.**

9           Q. Okay. Let's take orange off the table  
10          altogether, orange PEX, and let's focus on terra cotta  
11          white, blue and red. Based on the dependent transfer  
12          listing tests that were performed, NSF concluded that  
13          the white tubing met the extrapolated time to failure  
14          requirement of F2023. Fair?

15          **A. Again I'm going to ask for a copy of that**  
16          **report so that we could look at what it really says**  
17          **rather than trying to do this from memory.**

18          Q. Okay. Let's do focus on what these reports  
19          really say because I think that's important. Let's go  
20          ahead and mark this collection of documents as  
21          Exhibit 17.

22                 (Smith Exhibit Number 17 was marked for  
23          identification.)

24          Q. Okay.

25          **A. I need a minute to look at what you've**



1           **handed me please.**

2                   Q.   We'll walk through it together.

3                   **A.   I would like a minute to look through it,**  
4                   **please.**

5                   MR. KUHLMAN:   Okay.   Let's go off the  
6                   record.

7                   (A recess was taken.)

8                   Q.   Okay.   Ms. Smith, I have handed you a  
9                   document that we marked as Exhibit 17.   And this is a  
10                  collection of documents from a production that was  
11                  made by NSF and it includes a series of test reports  
12                  addressing the CPI tubing that was ultimately  
13                  certified by NSF as the 1006 tubing.   It includes the  
14                  test reports for terra cotta, red, white, and blue  
15                  tubing products and then also a copy of a  
16                  correspondence that outlines a certification.

17                  **A.   Which page are you referring to, please?**

18                  Q.   And then also a technical justification at  
19                  the conclusion of the document.   I'd like to ask you  
20                  some questions about these documents.   If you could  
21                  please turn to page NSF00002, it's the second page of  
22                  this document.   Have you ever reviewed these documents  
23                  before?

24                  **A.   I believe that I have reviewed at least some**  
25                  **of them.**

1 Q. Okay.

2 A. I would like to note for the record this is  
3 not the Jana report that I had asked for a copy of to  
4 reference. This is an altogether different set of  
5 documents.

6 Q. So this is report for a project number  
7 04-2566 and it states this is a DURA-PEX final report  
8 and if you look at this report here, this is for the  
9 terra cotta CPI tubing. Is that right?

10 A. It describes the tubing as half-inch CTS,  
11 SDR-9 red-brown tubing.

12 Q. Okay. If you could please turn back to  
13 NSF0004. Well, first let me ask you this: Is it your  
14 understanding that they tested approximately 16  
15 samples? If you look at table two on page FSF0003, it  
16 has the 16 different specimen IDs listed there.

17 A. It does say, under test results, testing was  
18 initiated for a total of 16 specimens.

19 Q. So as part of this process, 16 specimens  
20 were tested. Is that fair?

21 A. For this report.

22 Q. Okay. And if you look at page 4, FSF0004,  
23 it has a data analysis section and for intermittent  
24 hot water service, it has the extrapolated time to  
25 failure of 78 years. Is that right?

1                   **A. That is what it states, yes. This is --**

2                   Q. Okay.

3                   **A. This is the result I was referring to**  
4                   **earlier.**

5                   Q. If you could turn to page to NSF0005, the  
6                   conclusion of this report is based on the data and the  
7                   regression analysis. The tested sample of DURA-PEX is  
8                   predicted to have an extrapolated test lifetime of  
9                   78 years; 25 percent service at 60 degrees C and  
10                  75 percent service at 23 degrees C; 80PSIG for SDR-R9  
11                  pipe, which is above the minimum requirement of  
12                  50 years. Did I read that right?

13                  **A. You did read that correctly. And yet that**  
14                  **is the very same pipe that failed in the Plisko**  
15                  **residence after six years.**

16                  Q. My question was: Did I read that correctly?

17                  **A. And the answer was yes.**

18                  Q. Please answer the questions.

19                  **A. I did.**

20                  Q. So based on this test report, the terra  
21                  cotta tubing that CPI submitted for F2023 testing  
22                  passed the test with an extrapolated test lifetime of  
23                  78 years. Right?

24                  **A. That is correct.**

25                  Q. It's common in the industry for tubing

1 manufacturers to submit one pipe for a complete  
2 battery of F2023 tests and then additional colors  
3 under a different set of tests that fall under 2023  
4 for a dependent listing transfer. Is that right?

5 MR. SHAMBERG: Object to form.

6 **A. For the purpose of certification, they do**  
7 **have that option, yes.**

8 Q. Okay. And that's something -- all right.  
9 So with respect to CPI's tubing, CPI submitted the  
10 terra cotta tubing as the independent test sample and  
11 it was submitted to a whole battery of F2023 tests.  
12 And then CPI submitted its blue, white, red, and  
13 orange tubing under the DLT process that's permitted  
14 for manufacturers. Right?

15 **A. That is my understanding.**

16 Q. Okay. If you could turn back to page  
17 NSF00022. Actually, that's still the terra cotta one.  
18 Sorry. All right. NSF00031. All right. And this  
19 document is titled NSF international report for  
20 chlorine resistance PSF number J-00014573. Is that  
21 right?

22 **A. Yes.**

23 Q. And it lists the material as ATOFINA. Is it  
24 your understanding that that's the Total resin, Total  
25 and ATOFINA?

1                   **A. I would have to double-check. I don't**  
2                   **recall off the top of my head. I refer to the Total**  
3                   **resin as Total resin.**

4                   Q. Okay. And this is for the white tubing  
5                   product. Right? Is that the product?

6                   **A. Yes.**

7                   Q. Okay. The executive summary here at the  
8                   bottom, the fourth paragraph says when tested in  
9                   accordance with the ASTM F2023 test method and the NSF  
10                  policy number 55 for dependent transfer listing and  
11                  minor formulation changes, the PEX pipe sample tested  
12                  meets the requirements of the policy. Is that right?

13                  **A. Yes.**

14                  Q. And is it your understanding that the white  
15                  tubing met the terms of that policy and was able to be  
16                  added to the certification?

17                  **A. Yes.**

18                  Q. All right. Please turn the page over to  
19                  page NSF00035. And according to the extrapolated time  
20                  to failure for this white PEX product, when analyzed  
21                  pursuant to this policy, the time to failure -- the  
22                  extrapolated time to failure is listed as 68 years.  
23                  Yes?

24                  **A. For this product, yes, it is listed at 68**  
25                  **years, which is approximately ten years less than what**

1           **was demonstrated for the terra cotta pipe, was it not?**

2           Q. If you could please turn to page NSF00037.

3           **A. I would like to verify. Yes, the terra**  
4           **cotta pipe demonstrated an extrapolated test time of**  
5           **78 years and the white demonstrated a life of 68.**

6           **Which page did you want me to refer to?**

7           Q. Thirty-seven.

8           **A. Okay.**

9           Q. Do you understand how the data that's  
10          obtained during the dependent transfer listing testing  
11          is used in order to calculate that number, 68 years?

12          **A. I would not say particularly well.**

13          Q. Do you understand what it even means if the  
14          white data reflects 68 years versus 77, how they  
15          calculated that number?

16          **A. In essence.**

17          MR. SHAMBERG: Object to form.

18          Q. Are you familiar with the regression  
19          analysis that's performed as part of that dependent  
20          transfer listing calculation?

21          **A. Yes.**

22          Q. Okay. And do you understand that at this  
23          time, in 2005, if there were data points that fell  
24          outside above the predicted limit, it would penalize  
25          the regression? You understand that. Right?

1           A. I understand that the test was in a state of  
2           flux and change during that time period. I understand  
3           that it was a brand new test.

4           Q. Uh-huh.

5           A. I understand that it was a test that,  
6           particularly at that time, did not have a correlation  
7           with field experience. And I understand that as we  
8           sit here today, the field experience for these very  
9           same products that we're talking about that  
10          demonstrated a 68- and 78-year life in this test have  
11          demonstrated nowhere near that during service.

12          Q. My question to you --

13          A. And yes, I do understand they did toss out  
14          data points in the regression analysis.

15          Q. And that wasn't my question. My question  
16          was: Do you understand that at this time, in 2005, if  
17          you had data points that fell above the upper  
18          predictive limit for the time to failure, it would  
19          penalize the regression and cause the extrapolated  
20          time to failure to be lower because of that penalty?

21          A. I think you're misrepresenting what the data  
22          showed and how the data was treated and the reasons  
23          behind the data being treated in the manner it was.  
24          If you have a specific regression analysis curve and  
25          specific data points that you would like me to discuss

1           with you, I'd be happy to look at that.

2           Q. You sat on the committee that oversaw F2023.  
3           Right?

4           A. No, that's not correct. I did not join that  
5           committee until after the standard was developed.

6           Q. Okay. So were you on the committee in 2005?

7           A. No.

8           Q. When did you join the committee?

9           A. Not until after 2009. I don't recall the  
10          specific date. It was not until after I went into  
11          business for myself.

12          Q. Okay. So at around that time, in 2009, had  
13          NSF and the industry removed the penalty for the  
14          regression for tubing samples that had failures above  
15          the upper predictive limit that --

16          A. I don't recall as we sit here today.

17          Q. Okay. Were you involved in making that  
18          decision to have that penalty removed?

19          A. No.

20          Q. Okay.

21          A. No.

22          Q. Okay. Let's talk about NSF37.

23          A. Okay.

24          Q. This is also on the ATOFINA resin. Is that  
25          right?



1                   **A. It does state ATOFINA.**

2                   Q. Okay.

3                   **A. It should be noted for the record as well**  
4                   **these reports are all dated prior to 2006 thus far so**  
5                   **these were all reports that were generated using pipe**  
6                   **that was manufactured by CPI rather than NIBCO.**

7                   Q. Yeah. It has CPI as the company name up at  
8                   the top, does it not?

9                   **A. It does.**

10                  Q. And these are samples that were submitted by  
11                  CPI in an effort to obtain certification. Right?

12                  **A. Correct.**

13                  Q. All right. So if you could turn the page  
14                  over to 38, this lists the report number at the top  
15                  and this is for November 4, 2005 and it lists at the  
16                  very stop ATOFINA blue. Is that right?

17                  **A. It does state ATOFINA blue.**

18                  Q. So we talked about terra cotta and white.  
19                  Now we're talking about blue. All right. So does  
20                  this appear to you to be the test report issuing the  
21                  findings for the dependent listing transfer test for  
22                  the blue product?

23                  **A. It appears to be a report issuing the**  
24                  **findings. There may be more than one.**

25                  Q. If you could turn back to NSF40. And there

1 in the middle, it has some of the -- it has the  
2 extrapolated time to failure for intermittent hot  
3 water conditions is 56 years?

4 **A. 56 years, yes.**

5 Q. And the conclusion is when tested in  
6 accordance with the ASTM F2023 and the NSF policy  
7 number 55 for dependent transfer listing and minor  
8 formulation changes, the PEX pipe sample tested meets  
9 the requirements of the policy. Is that right?

10 **A. It did squeak by at 56 years, yes, it did.**

11 Q. The terra cotta pipe met the requirements of  
12 2023. Right?

13 **A. Demonstrating a predicted live of 78 years**  
14 **versus 56, yes.**

15 Q. Okay. My question was: The terra cotta  
16 pipe, based on these reports, met the requirements of  
17 F2023, did it not?

18 **A. It did.**

19 Q. The white CPI pipe met the requirements for  
20 the dependent transfer listing, did it not?

21 **A. It did.**

22 Q. The blue CPI pipe met the requirements for  
23 the dependent listing, did it not?

24 **A. It did.**

25 Q. All right. Turn to page 42.

1                   **A. Okay.**

2                   Q. This is the report for the CPI tubing sample  
3 that was submitted with the ATOFINA resin issue date  
4 November 4, 2005. Is that right?

5                   **A. Yes.**

6                   Q. And this is for CPI's red PEX pipe, the top  
7 line of the executive summary on the far right.

8                   **A. CPI red PEX pipe, yes.**

9                   Q. Right. Okay. So if you could look down at  
10 the fourth paragraph it says, the data set does not  
11 meet the criteria of section six of the policy that  
12 states that the values of the combined data set shall  
13 comply with the requirements of ASTM 2023 and ASTM  
14 F876. This is a result of the tested specimens  
15 lasting longer than the original regression predicted.

16                   This has penalized the regression as it has  
17 reduced the R-squared value of the combined data set  
18 to .887, which is below the .9 requirement of ASTM  
19 F2023 and has reduced the extrapolated time to failure  
20 of the combined data set to 44 years from the 78 years  
21 of the original data set, which is below the 50-year  
22 requirement of ASTM F876. Did I read that right?

23                   **A. You read what it says.**

24                   Q. All right. And you understand that the  
25 tubing samples that resulted in that regression

1 penalty lasted longer on the test than the terra cotta  
2 tubing samples. Right?

3 A. No, that is not my understanding of this.

4 Q. Okay.

5 A. You're again misrepresenting.

6 Q. They lasted longer --

7 A. The data -- they threw the data points out  
8 for a reason. There's a limit set for a reason.

9 Q. Okay.

10 A. And you have to delve in more deeply to this  
11 and look at the condition of the samples and what the  
12 samples actually showed to understand why those data  
13 points were removed. The takeaway from this is based  
14 upon the standards as they existed at the time and  
15 were universally applied. They had foundation for  
16 removing those data points and coming up with a number  
17 that they did. The number they ultimately came up  
18 with for red pipe was 44 years, which did not meet the  
19 50-year requirement. The red pipe did not pass that  
20 test.

21 Q. So you understand that as of this time, it's  
22 your position that those data points were tossed out  
23 because they were over the upper predicted limit?

24 MR. SHAMBERG: Object to form.

25 A. It's my position that their final

1 extrapolated time to failure that they reported on and  
2 stood on and stood by was 44 years for the red pipe,  
3 which did not meet the standard. It's also my  
4 position that meeting the standard clearly was not  
5 predictive of what was actually going to happen in  
6 real world applications.

7 The terra cotta pipe in Ms. Plisko's home  
8 most absolutely did not last 78 years. It failed due  
9 to oxidative degradation, which is I think undisputed  
10 in this case based on the ESI's report, in less than  
11 ten years in fact, which is a fraction of what this  
12 test suggested. It's my opinion that whether or not  
13 the pipe was certified in this test really is  
14 irrelevant in terms of the field performance that we  
15 have observed and that representing that that product  
16 was somehow not defective because it was certified is  
17 grossly misguided at best.

18 Q. Has any Uponor tubing -- any Uponor PEX  
19 product ever failed in the field?

20 A. I have not worked with Uponor since 2007,  
21 but prior to 2007 certainly there were PEX pipes that  
22 failed in the field.

23 Q. Okay. And they didn't make the 50 years --  
24 50-year anticipated life. Right?

25 A. The ones that were pierced by a bug

1           certainly did not. Those are the ones that I'm  
2           thinking of.

3           Q. Are these the only failures that you're  
4           aware of in Uponor PEX pipe?

5           A. No. There was another one that was used for  
6           an outdoor wood chipper where it was exposed to  
7           sunlight on a regular basis and it also failed.

8           Q. And is that the only other failure you're  
9           aware of with Uponor PEX pipe?

10          A. There was another one used in a dishwasher  
11          application, feeding a commercial dishwasher in a  
12          restaurant, where it was injected with chlorine doses  
13          and high temperatures. It also failed. That was not  
14          an approved application for the product. I am not  
15          aware of Uponor having these types of failures in  
16          their PEX pipe with pipes failing in less than ten  
17          years due to oxidative degradation if that's the real  
18          question you're trying to ask me.

19          Q. Are you aware of Uponor PEX pipe failing  
20          because of oxidative degradation at all to date?

21          A. Actually I'm not, in the absence of an  
22          anomalous condition like the ones we have just  
23          discussed. If they have had them, I'm not aware of  
24          them.

25          Q. But in the presence of elevated temperatures

1 or high chlorine levels, Uponor PEX pipe can fail as a  
2 result of oxidative degradation as well. Right?

3 A. Under certain circumstance of improper  
4 application, I believe that that is true. We're here  
5 today however to discuss NIBCO's pipe, not Uponor's  
6 pipe. And I'm bound by confidentiality with regard to  
7 Uponor so if you'd like to discuss Uponor further,  
8 we'll have to put their attorneys on notice before we  
9 can do that.

10 Q. So it's your position that NSF's final  
11 position with respect to this red tubing is that it  
12 did not meet the policy because the combined data set  
13 resulted in a 44-year analysis. That's your opinion?

14 A. Correct.

15 Q. In your mind, how is it that tubing that  
16 lasts longer on a test results in a lower extrapolated  
17 time to failure?

18 A. I was not part of the regression analysis.  
19 I'm not going to get into the mathematics behind what  
20 they did with that test. It's my opinion that this  
21 test is essentially irrelevant to the field  
22 performance of that product. It is my opinion that a  
23 manufacturer who has received data that says this pipe  
24 is not meeting the 50-year requirement in this brand  
25 new chlorine test that should have been a flag for

1       them to say, gosh, are we really okay selling this; if  
2       we really want it to perform as we intend to during  
3       service and we're holding it out as something that  
4       will survive 50 years and we have data that suggests  
5       that that might not really be the case, maybe we  
6       shouldn't be selling this product or until we learn  
7       something more or do something more to better  
8       stabilize it.

9               Q.    Okay.

10              A.    It is further my opinion that it is never  
11       sufficient for a manufacturer simply to defer to the  
12       fact that they have a listing to assume that that  
13       product is going to perform as intended, particularly  
14       when they're relying on a brand new test that has  
15       these kinds of variables at play and particularly when  
16       the results of that test are showing them that  
17       depending upon what color of pipe they've submitted in  
18       that test, the results could range anywhere from a  
19       predicted life of 44 years to 78 years.

20              That is a very big difference in predicted  
21       life, 34 years in fact difference in predicted life.  
22       That alone should have been a very big red flag to  
23       them that either there is something amiss with the  
24       test and it's not really telling us something valuable  
25       regarding our expected life and/or there's something



1 really amiss with our formulation and our process that  
2 is resulting in tremendous variability in our product  
3 and we as a manufacturer would be wise to get our arms  
4 around that before we put that product out into  
5 people's homes where it could fail.

6 Q. You have already admitted you're not an  
7 expert with respect to the math being used to reach  
8 these numbers. Right?

9 A. I don't believe I have admitted to something  
10 as you say.

11 Q. I thought you just said that a moment ago?

12 A. I said I have not held myself out to be an  
13 expert in statistics.

14 Q. Do you consider --

15 A. I said yesterday I do not consider myself to  
16 be an expert in statistics.

17 Q. Have you gone back and looked at the data  
18 and looked -- plugged it in to see how different  
19 numbers affected the regression analysis on these  
20 tubing samples?

21 A. Absolutely not. My task is not to reassess  
22 the chlorine standard. My task is to evaluate the  
23 field-return pipes and determine the root cause for  
24 them. And based on an in-depth analysis of that, I  
25 feel very comfortable reaching the conclusion that

1 terra cotta pipe in service has not demonstrated a  
2 life of 78 years in the Plisko residence.

3 Further, I feel very comfortable concluding  
4 that red pipe in the Sminkey residence and all these  
5 other homes did not demonstrate anywhere even close to  
6 44 years of life before failing due to oxidative  
7 degradation.

8 Q. You sit on the committee that oversees  
9 F2023, right, currently?

10 A. I sit on the committee that oversees all  
11 standards related to polymer pipe.

12 Q. And the testing that is used today under  
13 F2023, it's essentially the same method that was used  
14 in 2005. Right?

15 A. There have been some changes.

16 Q. Okay. But in large part, it's the same?

17 A. I wouldn't necessarily say that.

18 Q. Okay.

19 A. There have been some changes.

20 Q. What have been the changes from 2005 to the  
21 current test that's used under 2023?

22 A. I can't speak to that as we sit here today.  
23 Do you have copies of each different standard?

24 Q. I do not.

25 A. Okay. Then we can't discuss that.

1           Q. Can you think of any significant changes to  
2           the test that has occurred from 2005 to the present  
3           for F2023?

4           **A. Not as we sit here today --**

5           MR. SHAMBERG: Object to the term  
6           "significant."

7           **A. Not as we sit here today with nothing to**  
8           **reference, no.**

9           Q. Can you identify -- and you sit on this  
10          committee. Can you identify any specific changes to  
11          the testing as performed under the standard from 2005  
12          to the present?

13          **A. Not as we sit here with no documents to**  
14          **reference, no. I answered that several times.**

15          Q. Okay. So with respect to the analysis of  
16          the data, are you aware of changes from 2005 to the  
17          present?

18          **A. I believe that changes have occurred.**

19          Q. And one of those changes was to remove this  
20          penalty with respect to specimens that lasted longer  
21          than the upper predictive limit. Isn't that right?

22          **A. I would need to reference the documents to**  
23          **see what changes have occurred as I've said several**  
24          **times. If you have them, I'll be happy to try to look**  
25          **at those with you. But let me be very clear, the**

1 standard that I sit on, first of all, is not dedicated  
2 to this standard. The committee I sit on is not  
3 dedicated to this and my involvement with the  
4 development of this standard, as I said before, was  
5 very, very minimal. And my future involvement with  
6 this standard, if any, would be probably to express  
7 concerns about it.

8 Q. Okay.

9 A. I have a lot of concerns about the fact that  
10 we're seeing tremendous disconnects between what lives  
11 are being predicted through these tests and what lives  
12 we have seen empirically with the NIBCO products.  
13 Clearly there is a disconnect.

14 Q. How often does the committee meet?

15 A. They typically meet a couple times a year.  
16 I do not typically participate in those meetings.

17 Q. Okay. So you're on the committee, but --

18 A. I'm a voting member.

19 Q. -- you don't go to those meetings?

20 A. I'm not a developing member. I'm a voting  
21 member.

22 Q. Okay.

23 A. My involvement with that committee is only  
24 to the extent that they will send around standards for  
25 review and comment and voting. Some of the things

1           that come around, I take the time to review; others I  
2           don't take the time to review or vote on. I abstain  
3           from voting if I'm too busy to take time to review the  
4           standard.

5                       It's all done on a volunteer basis so I  
6           don't review every standard that is put forth for  
7           comment. And I don't believe I have ever commented on  
8           this specific standard.

9                       Q. Are you aware, yes or no, about what  
10          happened to the penalty to the regression for tubing  
11          samples that lasted longer than the upper predictive  
12          limit?

13                      MR. SHAMBERG: Object to form.

14                      A. I have some awareness that changes have been  
15          made to this standard over time. I'm not comfortable  
16          trying to respond to questions related to specific  
17          changes when we don't even have copies of those  
18          documents here to refer to.

19                      Q. I'm just asking if you're aware. Do you  
20          know what happened to that penalty?

21                      A. And I answered that.

22                      Q. To the regression --

23                      MR. SHAMBERG: Objection. Asked and  
24          answered several times.

25                      MR. KUHLMAN: It hasn't been answered at

1 all. That's the issue. We ask a question and no  
2 answer is provided that's responsive.

3 MR. SHAMBERG: You asked a specific  
4 question.

5 MR. KUHLMAN: Let's try again.

6 MR. SHAMBERG: She said she can't answer it  
7 without referencing documents.

8 Q. Then the answer is no?

9 **A. No, that's not the answer.**

10 Q. Sitting here today --

11 **A. The answer was I have awareness that changes**  
12 **have been made --**

13 Q. I'm asking you, are aware of --

14 **A. -- and that I am not comfortable with --**

15 Q. Are you aware of any changes to that  
16 specific part of the interpretation of the data?

17 **A. And I have said several times I believe**  
18 **multiple changes have occurred and I am not**  
19 **comfortable addressing questions related to specific**  
20 **changes when we have no documents here to reference.**

21 Q. And are those changes that you're aware of  
22 pertaining to how penalties were applied to regression  
23 analyses when samples lasted longer than the upper  
24 predictive limit?

25 **A. I believe that there have been some changes**

1           made to the way that these values were treated I'm not  
2           going to discuss those in any further detail without  
3           any documents whatsoever here to reference. I believe  
4           that that is unfair I believe that you are  
5           misrepresenting a lot of what has transpired with  
6           regard to those standards. I believe that that  
7           terminology that you're using, even using the term  
8           "penalty," is misrepresentative of what has actually  
9           transpired so --

10           Q. If you could please look at --

11           A. We're not going to address that further.

12           Q. If you could please look at NSF42. Down  
13           here in this fourth paragraph it says, this has  
14           penalized the regression. Now, when something is  
15           penalized, that's a penalty. Is that fair?

16           A. You're talking about policy, not language  
17           that's in this paragraph. I don't believe there's  
18           anything in the standard that uses the term  
19           "penalizing" or something to that effect today --

20           Q. Now, F876 --

21           A. -- in this NSF letter.

22           MR. SHAMBERG: Kevin, let her finish.

23           Q. In fairness to NIBCO, NSF advised CPI in  
24           this report that the reason why this data set had a  
25           44-year extrapolated life is because the specimens

1       lasted longer than the original regression predicted,  
2       resulting in the regression being penalized and  
3       reducing the R-squared value. That's what NSF is  
4       conveying to NIBCO. Fair?

5               A. This was the justification that was used to  
6       give them a listing for the red pipe, despite the fact  
7       that it had failed the test. Yes, that is what it  
8       says in this document.

9               Q. That's your opinion?

10              A. Yeah. That's the facts. That's the facts  
11       as presented in the case.

12              Q. Let's keep looking at some additional  
13       documents.

14              A. All that aside, the fact remains these red  
15       pipes, during service, have failed due to oxidative  
16       degradation in far less than 44 years. In fact, they  
17       have failed repeatedly from coast to coast in less  
18       than ten years. That is not just true for the red  
19       pipe that you say was penalized, that's also true for  
20       the blue pipe that wasn't penalized, that was deemed  
21       to have passed. It is also true for terra cotta pipe  
22       that was deemed to perform the best of all of NIBCO's  
23       products --

24              Q. Ms. Smith --

25              A. -- with an -- I'm sorry, but please let me



1           **finish my answer.**

2           Q. This is not an answer to a question that is  
3           pending.

4           **A. To 78 years of predicted life.**

5           Q. Ms. Smith, at this rate, we will be here all  
6           day. If you could please just try to answer the  
7           questions and I appreciate that you want to advocate  
8           your case and you want to get all these sound bites  
9           out there, but please just let's focus on answering  
10          the question so we can move on.

11          **A. With all due respect --**

12          Q. Okay.

13          **A. -- you've asked me to testify that I will**  
14          **answer questions completely and trying to focus in on**  
15          **small, little snippets that are being misrepresented**  
16          **and that are not consistent with what's actually**  
17          **happening in the field is not providing you a complete**  
18          **answer. So if you want me to be truthful and**  
19          **complete, then I will need to do that.**

20          Q. Just please try to answer the question.  
21          Okay?

22          **A. Okay.**

23          Q. If you could turn to page NSF76. This is a  
24          document that's produced by NSF and it appears to be a  
25          letter to Debbie Premus. Is that right?

1                   **A. It is addressed to Ms. Premus, yes.**

2                   Q. Okay. And this states here from NSF, this  
3 letter is to inform you of the addition of Lebanon  
4 production facility to the NSF standard 14 listings.  
5 The listing of DURA-PEX PEX tubing produced using  
6 Total Petrochemicals CD4300 HDPE material will appear  
7 as follows and then it has a listing. Is that right?

8                   **A. Will appear as follows. It has a box with**  
9 **text in it.**

10                  Q. It has a box with text in it. Okay. And  
11 the box has pipe one-quarter inch through  
12 one-and-a-quarter inch SDR9. Is that right?

13                  **A. Yes.**

14                  Q. And then it has PEX DURA-PEX ASTM F876/877.  
15 Right?

16                  **A. Yes.**

17                  Q. All right. And then underneath that,  
18 there's a plus, a number sign and a caret. You see  
19 those?

20                  **A. I do.**

21                  Q. And the number sign or hashtag as people  
22 call it now, it says the product is authorized for  
23 white, blue, red, and terra cotta colors. Do you see  
24 that?

25                  **A. I do.**

1 Q. This was issued in June of 2005. Right?

2 A. Yes.

3 Q. And that's before these test results came  
4 out in November of 2005. Fair?

5 A. Yes.

6 Q. And the caret indicates meets the chlorine  
7 resistance requirements of ASTM F876 when tested in  
8 accordance with ASTM F2023 is what it indicates.  
9 Correct?

10 A. That's correct. They issued a listing  
11 before the thing was complete.

12 Q. Okay. If you look down, the listing is  
13 based on the following and it gets down into these  
14 little symbols. And if you look to the last one it  
15 says assigned technical justification approving  
16 preliminary data provided by Jana Laboratories as  
17 sufficient data for the initial listings of red, blue  
18 and white tubing. The samples have met the minimum  
19 requirements of ASTM F2023 though testing is not yet  
20 complete. Do you see that?

21 A. I do see that.

22 Q. So NSF is telling CPI that the tubing has  
23 already lasted long enough to pass these tests. That  
24 what it says right here. Right?

25 A. That is what it says.

1 Q. And then it says, the following samples are  
2 being tested by Jana laboratories, it says blue, red  
3 and white. Right?

4 A. I see blue, red, white.

5 Q. All right. So at the time, in 2005, NSF was  
6 telling CPI the tubing has lasted long enough, it's  
7 going to pass the test. Right?

8 A. NSF was telling CPI that they were relying  
9 on communications from Jana Laboratories indicating  
10 that the data was consistent enough that they felt  
11 that it was worthy of presenting this provisional  
12 listing.

13 Q. Okay. So is this?

14 A. And then it failed the test.

15 Q. Is this the provisional listing you're  
16 talking about?

17 A. They're not using that term in this  
18 document, no.

19 Q. But is that what that means to you?

20 A. That is what Jana referred to it as in a  
21 2009 summary report.

22 Q. Okay. So a listing or the testing, but  
23 hasn't been done yet, that's, to you, a provisional  
24 listing?

25 A. That Jana Laboratories referred to it as a

1           provisional listing in the 2009 report.

2           Q. You referred to it as a provisional listing  
3           in your testimony and I want to know what that means  
4           to you.

5           A. I just answered that. I refer to that based  
6           upon Jana's 2009 report that I asked for you to  
7           produce so that I could reference, but you have not.  
8           That is not that document. If you have that document  
9           and we can look at that you will see where that term  
10          comes from. It's a term Jana Laboratories used.

11          Q. So if you could, let's flip the page back,  
12          back to NSF83. And this is a document titled  
13          technical justification. Is that right?

14          A. Yes.

15          Q. And we just talked about a technical  
16          justification from Jana Labs in that prior  
17          correspondence from June. Right?

18          A. I don't recall the date, but yes.

19          Q. Okay. Let's look -- let's make sure we're  
20          clear on this. The date on NSF76 that we were talking  
21          about, that's June 2005. Right?

22          A. Yes, June 17, 2005.

23          Q. And that's the day that CPI was told, hey,  
24          look, the testing is ongoing but the samples have met  
25          the minimum requirements even though the testing is

1 not done. Right? That's in June. Right?

2 **A. Yes.**

3 Q. All right. And then there's this technical  
4 justification, now this one is dated, according to the  
5 signature block, December 2, 2005. Right?

6 **A. Yes. And it should be noted this was**  
7 **submitted by Aleesha Valentine.**

8 Q. And Aleesha Valentine worked for NSF at the  
9 time?

10 **A. At that time.**

11 Q. This is an NSF technical justification, not  
12 a Jana technical justification, that was referenced  
13 before. Right?

14 **A. That is correct.**

15 Q. Okay. So this is in December of 2005.  
16 Correct?

17 **A. I'm looking.**

18 Q. It's at the bottom in the signature block?

19 **A. Yes. Thank you.**

20 Q. Now, the blue -- the red test result was  
21 released, and if you want to check my dates you can,  
22 it's on NSF42, that was released on November 4th,  
23 2005. Is that right?

24 **A. What page?**

25 Q. Forty-two?

1                   **A. Yes.**

2                   Q. All right. So a few weeks later NSF is  
3 looking at the data. They have seen the data from the  
4 red test and NSF prepares this technical  
5 justification. Fair?

6                   **A. Apparently.**

7                   Q. All right. And it says here the DLT of  
8 orange and red pipe meets the requirement of plastic  
9 program policy 55 per plastics program policy 56. A  
10 combination of two colors was used in the DLT  
11 calculations; orange and white for orange, red and  
12 blue for red. These products can be added to CPI's  
13 official listing. Is that what it says?

14                  **A. That is what it says.**

15                  Q. And the policies, the plastic program  
16 policies, are what NSF uses to interpret the test  
17 results, are they not?

18                  **A. Do you have a copy of those policies with**  
19 **you so that I can --**

20                  Q. You can answer the question.

21                  **A. I'm telling you --**

22                  Q. The question doesn't pertain to the policy.

23                  **A. I don't feel like I can answer the question**  
24 **without the policy that is what they state they used**  
25 **for this case or this --**

1 Q. Okay. And are you aware of what plastic  
2 program policies are?

3 A. Not off the top of my head. I want to  
4 see --

5 Q. Okay. So it's fair to say you're not  
6 involved in reviewing plastic policy programs at NSF?

7 A. I have not --

8 Q. And you have not reviewed --

9 A. -- seen 55 and 56 to my knowledge. It may  
10 be that I have seen them and they have been called  
11 something else, which is why I want to see them.

12 Q. With respect to tubing samples, you did not  
13 review plastics program policy 55 or 56. Is that  
14 fair?

15 A. As I said, I may have reviewed them and they  
16 were called something else or I'm just not recalling  
17 that title. If you have a copy, I would be happy to  
18 look at them and see if it's something I have reviewed  
19 and am familiar with or not.

20 Q. According to NSF per plastics program policy  
21 55 per plastics program policy 56, the red pipe met  
22 the requirements of F2023. Right?

23 A. That is what they're saying here. And yet  
24 it still failed in less than ten years in the Sminkey  
25 residence and others.



1 Q. Please just answer the questions.

2 A. I'm answering it completely.

3 Q. So with respect to these test results and  
4 what NSF was doing according to the policies that were  
5 in place according to NSF the terra cotta, red, white,  
6 and blue, NIBCO CPI 1006 PEX products met the  
7 requirements of F2023 for the listing. Right?

8 MR. SHAMBERG: Object to form, foundation.

9 A. They managed to maintain -- or obtain a  
10 listing based off of that testing.

11 Q. So CPI obtained a listing based on the data  
12 and the reports that we just looked at, right, in  
13 addition to --

14 A. They obtained.

15 Q. -- other things?

16 A. In addition to other things, yes, they  
17 obtained a listing --

18 Q. All right.

19 A. -- a certification.

20 Q. And when the certification is listed  
21 NIBCO -- not NIBCO. Sorry. Hold on. All right. So  
22 in order to obtain a certification, CPI had to satisfy  
23 NSF that its tubing resin met the density requirements  
24 of F876. Right?

25 A. You have switched documents. Let me get

1           **with you.**

2           Q.   If you need the document, we marked it as  
3   Exhibit --

4           **A.   I have it here.**

5           MR. SHAMBERG:   Sixteen.

6           Q.   -- 16.

7           **A.   Yeah.   Okay.   So where are you?**

8           Q.   We're on page four.

9           **A.   Okay.**

10          Q.   So to obtain the certification, CPI had to  
11   satisfy NSF that its tubing resin met the density  
12   requirements in 6.4.   Right?

13          **A.   Among others, yes.**

14          Q.   Well --

15          **A.   Density is one of many.**

16          Q.   And I have asked about one thing so let's  
17   just focus on answering the question that's asked.  
18   CPI had to satisfy NSF that its tubing met the  
19   hydrostatic sustained pressure strength requirement of  
20   6.5?

21          **A.   Correct.**

22          Q.   And CPI had to satisfy NSF that its tubing  
23   met the hydrostatic burst pressure test in 6.6.  
24   Right?

25          **A.   Correct.**

1 Q. And CPI had to establish to NSF's  
2 satisfaction that its tubing met the requirements for  
3 environmental stress cracking. Right?

4 A. Correct.

5 Q. And degree of crosslinking?

6 A. Correct.

7 Q. Also stabilizer functionality. Right?

8 A. Correct.

9 Q. And CPI had to satisfy NSF that its tubing  
10 met the oxidative stability in the potable chlorinated  
11 water application requirement in 6.10. Right?

12 A. Correct.

13 Q. And that's the F2023 test we just talked  
14 about. Right?

15 A. Yes.

16 Q. And so when NSF issued this certification  
17 for the tubing --

18 A. You left out a few things but --

19 Q. There are other requirements, but those are  
20 the ones I wanted to ask you about so I did. And with  
21 respect CPI's tubing, when that certification was  
22 issued for the 1006 tubing, it satisfied NSF that it  
23 met the requirements of F876 in total?

24 A. For certification purposes, yes.

25 Q. For certification purposes. And then in

1 order to maintain that listing, this certification  
2 listing, CPI had to subject itself to periodic audits.  
3 Right?

4 **A. Correct.**

5 Q. And NSF would conduct those when it felt  
6 like doing so. Fair?

7 **A. It would conduct them in general in**  
8 **accordance with the schedule in theory, though we know**  
9 **from experience that didn't always happen.**

10 Q. And they can do random audits if they are so  
11 inclined. Right?

12 **A. If they choose to, that's correct.**

13 Q. So pretty much per the schedule and when  
14 they feel like it. Right?

15 **A. That's my understanding.**

16 Q. All right. And CPI, to the best of your  
17 knowledge, NSF never took back CPI's certification for  
18 this tubing. Right? They never canceled it.

19 **A. They did not actually cancel it. That would**  
20 **be a correct statement.**

21 Q. And then when NIBCO acquired the assets of  
22 CPI, that listing, the certification was ultimately  
23 transferred over to NIBCO, was it not?

24 **A. That is my understanding.**

25 Q. All right. And NIBCO maintained that

1 certification during the entire time it was  
2 manufacturing this product.

3 **A. They did.**

4 Q. Right?

5 **A. They did manage to maintain it somewhat by**  
6 **luck, but yes, they did manage to maintain it. It was**  
7 **maintained in part because a followup audit was not**  
8 **performed within the scheduled timeframe as expected.**

9 Q. To be fair to NIBCO, a followup audit was  
10 performed on blue tubing and it passed the  
11 requirements of the chlorine test, did it not?

12 **A. Which test are you referring to? I'd like**  
13 **to look at the results, please.**

14 Q. Are you familiar with the audit that was  
15 performed, yes or no?

16 **A. I understand that there was an additional**  
17 **audit and additional testing performed, yes.**

18 Q. Is it your understanding that the tubing  
19 samples tested for chlorine resistance as part of an  
20 audit passed?

21 **A. I would like to know which test you're**  
22 **referring to, but yes, I believe that it passed by the**  
23 **skin of its teeth.**

24 Q. So it met the requirements? Skin of its  
25 teeth or not, it met the requirements?

1           A. It would have met that requirements of that  
2           certification test, yes, although clearly it did not  
3           meet that same demonstrated life in the field.

4           Q. And that's something that the standard  
5           anticipates, is it not?

6           A. Apparently not.

7           Q. No. The standard -- isn't it true that the  
8           standard anticipated that the life expectancy in the  
9           field will not match the test?

10          A. I don't believe in any way that that  
11          standard anticipates that pipe is going to fail in as  
12          little as one to two years in service.

13          Q. But that wasn't the question.

14          A. Well, I think it was.

15          Q. The question was: Isn't it true that the  
16          standard anticipates that tubing in the field will not  
17          last as long as it does on the test if certain  
18          environmental factors are present?

19          A. I don't believe that it does, but if you'd  
20          like to point me to a certain portion of the standard,  
21          I'll be happy to review it and see if that opinion may  
22          change.

23          Q. Is it your opinion, and I'll show you the  
24          document here in a minute, that the standard F2023,  
25          which is under the jurisdiction of the committee that

1           you sit on, doesn't anticipate that the life of tubing  
2           will be shorter in practice than it is on the test?

3                   MR. SHAMBERG: Object to form.

4                   A. I don't necessarily recall any language that  
5           specifically states there's some expectation that  
6           there will be a significant difference. It may have  
7           language saying that there could be, but I don't  
8           believe that it assumes that it necessarily will be.

9                   Q. And the standard indicates that --

10                  A. I'll be happy to review it.

11                  Q. Installation stresses can reduce the  
12           expected life of the product. Right?

13                  A. I would like to see the standard to see what  
14           it actually says and reference it if I'm going to  
15           answer your questions about the standard. If you have  
16           a copy you would like me to look at, I'll be happy to  
17           discuss it with you.

18                  Q. Okay.

19                   MR. SHAMBERG: I could use a bathroom break.

20                   MR. KUHLMAN: Okay. Let's take one.

21                   (A recess was taken.)

22                  Q. So I'd like to ask you a few more questions  
23           about Exhibit 16 if I could. Exhibit 16 is the F876  
24           standard specification for crosslinked polyethylene  
25           tubing. Who developed this standard?

1           A. I'm not sure I understand your question.

2           Q. I mean, is it developed by experts in the  
3 piping field, plumbers' committees?

4           A. It would be developed by a committee of  
5 folks from the industry and from the field with input  
6 from others. Their responsibility is to draft  
7 language. I believe that the gentleman who initially  
8 drafted the language in this document was an  
9 individual and typically they would hire an individual  
10 to draft proposed language.

11           The committee would oversee the development  
12 of that and kind of lay some framework for that and  
13 then others in the industry would comment on that.  
14 The committee would be responsible for distributing  
15 that for comment and reviewing the comments and  
16 considering those comments and then ultimately working  
17 together to finalize the document. You're referring  
18 to the '09 version. I can't speak to who the  
19 individuals were.

20           Q. Right. But generally speaking, with respect  
21 to the original version and the versions that existed  
22 in between '09 and the original and even the ones that  
23 came thereafter, the people -- the types of people  
24 that were involved in creating the standard and the  
25 changes to the standard remain the same?



1           **A. The original document was originally drafted**  
2           **by a gentleman with expertise in the production of PEX**  
3           **pipe.**

4           Q. Okay. So it was drafted by someone with  
5           expertise in PEX pipe and there are committees that  
6           would include experts and industry members who would  
7           provide comments on the language and ultimately once  
8           everyone can reach an agreement on what it needs to  
9           say, it becomes a standard?

10          **A. That has been my experience.**

11          Q. Okay. So is it fair to say that in your  
12          opinion, a lot of thought from a lot of experts went  
13          into the drafting of the standard?

14          **A. Quite likely. Again, I was not part of that**  
15          **process at the time this was originally drafted so I'm**  
16          **making the assumption that the process would be**  
17          **similar to what I have experienced. But if it were**  
18          **similar to what I have experienced, then yes, that**  
19          **would be true.**

20          Q. And you would be disappointed to find out  
21          some person off the street wrote this. Right?

22          **A. I don't believe a person off the street**  
23          **wrote this.**

24          Q. Yeah. I mean, this was a document prepared  
25          by experts in the industry considering the impacts on

1           its words on manufacturers and the public. Fair?

2                   **A. I believe that to be fair, yes.**

3           Q. And these people were thinking not only  
4 about the manufacturers, but they were also thinking  
5 about the public and the safety of the public?

6                   **A. You would have to ask them what they were**  
7 **thinking. I can't speak to what they were thinking.**

8           Q. What do you think?

9                   **A. I doesn't matter what I think. I wasn't**  
10 **part of the committee. You would have to ask them**  
11 **what they think.**

12           Q. Do you think these standards are intended to  
13 aid the public so that they understand if they're  
14 getting a certified product, somebody put some thought  
15 into it and made sure the certification meant  
16 something?

17                   MR. SHAMBERG: Objection to form, calls for  
18 speculation.

19                   **A. I do not necessarily think that that is**  
20 **across the board true for all ASTM standards, no.**

21           Q. Do you think people in the public look to  
22 see if a product is certified when they're making  
23 buying decisions?

24                   **A. I think most people in the public, when**  
25 **you're talking about plumbing pipe, don't make the**

1           buying decisions. I think most of those decisions are  
2           made by plumbers or builders and that most people in  
3           the public may not even know what type of plumbing  
4           pipe they had, let alone have any contribution to that  
5           decision so probably not.

6           Q. Fair enough. In the plumbing industry, the  
7           plumbers have to buy product that's been certified in  
8           order to comply with the plumbing codes. Right?

9           A. In order to comply with the plumbing code,  
10          yes.

11          Q. So the consumers who are buying PEX for the  
12          plumbers and the people who are looking at putting it  
13          in, as professionals, they have to look to the  
14          standards if they want to comply with the plumbing  
15          code?

16          MR. SHAMBERG: Object to form.

17          A. I don't believe they look to their standards.  
18          I believe that they look for pipe that is certified.

19          Q. They look for a certification. And  
20          homeowners who are installing tubing should also try  
21          to comply with the plumbing code, should they not?

22          A. I have never encountered a homeowner yet  
23          that was familiar with what the plumbing code says.

24          Q. Do you think the plumbing code is designed  
25          to make sure that people have quality plumbing systems

1 in their houses?

2 MR. SHAMBERG: Objection. Calls for  
3 speculation.

4 Q. I mean, what do you think?

5 A. I have not contributed to the development of  
6 plumbing codes. If you would like to know why they  
7 were developed or what the thought processes were, you  
8 would have to ask the developers.

9 Q. Have you reviewed it?

10 A. I have reviewed portions of it.

11 Q. And the parts that you have reviewed are  
12 there to make sure that people are getting quality  
13 plumbing systems?

14 MR. SHAMBERG: Objection. Calls for  
15 speculation.

16 A. I can't speak to why they were developed or  
17 what the thought processes were. I can only speak to  
18 what they state.

19 Q. Okay.

20 A. If you have a copy of it, I'd be happy to  
21 review it with you and discuss any aspect of it that  
22 you think we need to discuss.

23 Q. Did you review any parts of it for your  
24 analysis of the Meadow or Cole cases?

25 A. Probably not specifically. I have reviewed

1           them at various times through my career, but probably  
2           not specifically as I recall.

3           Q. Do you have an opinion about whether or not  
4           any of the installations that you observed in the Cole  
5           or Meadow plaintiffs' houses had violations of the  
6           plumbing code?

7           A. Some of them exceeded 80 PSI. It is in the  
8           plumbing code that for chlorinated water, the pressure  
9           should not exceed 80 PSI or at least it has been in  
10          some years. I don't know if that language is still in  
11          there today. So some of them did not necessarily  
12          conform, the day we measured them, regarding to  
13          pressure.

14          Q. Did you observe any other failures to comply  
15          with the plumbing code in the Cole or Meadow  
16          plaintiffs' houses?

17          A. Not that I recall specifically as we sit  
18          here.

19          Q. What about temperatures in excess of  
20          140 degrees for chlorinated water applications?

21          A. We did some see some temperatures that were  
22          in excess of 140 degrees. Again, if you have a copy  
23          of the plumbing code, we can see if it still verifies  
24          the temperature limit. I believe it does.

25          Q. To the best of your knowledge, you believe

1 temperatures in excess of 140 degrees for chlorinated  
2 water is a violation of the code. Right?

3 A. I believe that that aspect of the  
4 installation manual for NIBCO came from the plumbing  
5 code, yes.

6 Q. And you observed that in some of these  
7 houses. Right?

8 A. Yes, slightly.

9 Q. Can you think of any other failures that you  
10 saw in the plaintiffs' homes that -- can you think of  
11 any other things you saw in the plaintiffs' plumbing  
12 systems that violated the plumbing code?

13 A. Not that I recall as we sit here today.  
14 Again, if you have a copy of the plumbing code, I  
15 would be happy to walk through it. You're asking me  
16 to just recall from memory what the plumbing code says  
17 and it's rather lengthy. I'm not comfortable relying  
18 on my memory. If I have a copy of it to refresh my  
19 recollection of what it says, that might be helpful.

20 Q. Okay. And what about PEX piping being  
21 connected directly to a water heater?

22 A. It should not be. The focus of my  
23 inspection was to look at NIBCO's installation  
24 guidelines and what it would state at different times,  
25 different years. But PEX piping should not be

1 connected directly to the hot water heater as a rule.

2 Q. Okay.

3 A. Most manufacturers specify some requirement  
4 about that in their installation instructions.

5 Q. Okay. Well, let's talk about what you were  
6 looking for then. Did you look for installations that  
7 were inconsistent with NIBCO's installation manual?

8 A. What I looked for was whether or not there  
9 was any evidence of any type of installation error  
10 that could be a root cause of failure for the incident  
11 pipes at issue in this case. Certainly, we saw  
12 different things that were not in keeping with NIBCO's  
13 installation instructions in every aspect.

14 However, we found no correlation whatsoever  
15 in a consistent trend as a root cause of failure for  
16 those pipes. We found, for example, some houses did  
17 have elevated pressure about 80 PSI. We found that  
18 some houses had slightly elevated temperature for at  
19 least some period of time. Both of those conditions  
20 are not in keeping with the installation instructions.

21 However, when we look at pipe that came from  
22 a home that had elevated temperature and pressure such  
23 as the Meadow residence, where both of those  
24 conditions were in excess of the specified  
25 requirements, that pipe still lasted longer than it

1           did in other homes where virtually identical failures  
2           from the same failure mechanism occurred in the  
3           absence of elevated pressure or temperature.

4                       So what I was looking for was  
5           characteristics that would reflect the root cause of  
6           failure for the pipes.

7                       Q.   So you were looking at things that you would  
8           consider to be the root cause of a failure and not  
9           necessarily things that might increase the rate within  
10          which a failure were to occur?

11                      A.   I looked for all of it. I looked for any  
12          evidence of excessive bending. We looked for evidence  
13          of excessive pressure. We looked for evidence of  
14          excessive temperature. We looked to see whether or  
15          not pressure relief valves were installed. We looked  
16          to see whether or not water chemistry was unusual in  
17          some manner. We evaluated the pH. We evaluated  
18          chlorine. We evaluated oxygen. A whole host of  
19          parameters were evaluated with respect to water  
20          chemistry.

21                      We looked at the manner of installation to  
22          see if that was consistent with the installation  
23          guidelines, but more importantly if there were any  
24          inconsistencies, were they inconsistencies that  
25          mattered. You know, it's not uncommon to see



1 deviations from the installation manual in plumbing  
2 assemblies.

3 In fact, I don't know that I have walked  
4 into a plumbing installation yet where I couldn't find  
5 something I would point to to say that's not an ideal  
6 condition or that's not in keeping with the  
7 installation instruction. But that does not  
8 automatically mean that that contributed to failure so  
9 you have to go that next step.

10 Q. Did you observe any excessive bending in the  
11 plaintiffs' homes that you inspected for this case?

12 A. I did not.

13 Q. When I say this case since, we combined  
14 these two depositions together. I'm talking about the  
15 Meadow and the Cole claims together.

16 A. I did not.

17 Q. Okay.

18 A. We certainly saw areas of bend and we saw  
19 some cracks that occurred at bends, but I did not see  
20 any bend that was in excess of the minimum bend radius  
21 specified in the installation manual, certainly not  
22 related to one of the incident pipes or failure. I  
23 didn't see it at all.

24 Q. Okay. And you did observe in at least a few  
25 homes, in the plaintiffs' homes, recirculation

1 systems, did you not?

2 A. I would have to look back at the specific  
3 results. I don't recall off the top of my head pipes  
4 systems, but there may have been.

5 Q. Okay. And if a recirculation system was  
6 installed in one of the plaintiff's homes and it was  
7 set to circulate more than 25 percent of the time,  
8 that would be a violation of NIBCO's installation  
9 manual, would it not?

10 A. It would. Well, let me back up. It depends  
11 on which installation manual you look at. Not all of  
12 them specified a limit for the amount of time so it  
13 would depend upon which specific installation manual  
14 you're referring to.

15 Q. When did NIBCO put that into its  
16 installation manual?

17 A. I don't recall off the top of my head if you  
18 have a series of installation manuals from 2006  
19 through say 2012. I would be happy to look at them  
20 and compare them.

21 Q. Okay. So if we looked, you know, later on  
22 down the road and wanted to see if it was in there, we  
23 could do a quick look, compare it to the installation  
24 date and if it was in the manual at the time, it's a  
25 violation and if it's not, it's not. Fair?

1                   **A. Fair enough in terms of comparing to the**  
2                   **installation manual.**

3                   Q. Okay. Now, with respect to the standard --

4                   **A. Which standard are you referring to?**

5                   Q. The standard that's applicable to PEX  
6                   tubing.

7                   **A. There are many standards applicable to PEX**  
8                   **tubing. Which specific standard are you referring to?**

9                   Q. Well, let's talk about F876. Does, F876 --  
10                  well, strike that. The NIBCO tube at issue here is  
11                  1006 tubing. Right?

12                  **A. Yes.**

13                  Q. And that means when it's tested, it's met  
14                  the requirements for the 50-year extrapolated time to  
15                  failure under the circumstances with 75 percent of the  
16                  time at a lower temperature and 25 percent of the time  
17                  at a higher temperature. Right?

18                  **A. That is what the numbers would indicate.**

19                  Q. And would you expect plumbers to select  
20                  material that is appropriate for their installation  
21                  such as if they're going to put a recirculation  
22                  system, they buy the right tube for the settings they  
23                  plan to employ?

24                  MR. SHAMBERG: Objection. Calls for  
25                  speculation.

1           A. I can't speak to what plumbers think or what  
2 plumbers do. I can speak to what the numbers  
3 represent on the pipe.

4           Q. Well, you would expect that a plumber, as a  
5 professional, should understand the reasons why  
6 they're selecting the materials that they're using?

7           A. Not necessarily. I don't know why a plumber  
8 would necessarily know what those numbers would mean.  
9 I don't necessarily believe those numbers are taught  
10 to them. I've certainly had plenty of plumbers say to  
11 me, I have no idea what those numbers mean. I know  
12 that not all plumbers do understand what those numbers  
13 mean. I'm not going to speculate as to whether or not  
14 they should. That's not my role. I know that they do  
15 not always know what those numbers mean.

16          Q. Okay. All right. Would you agree with me  
17 that certain installation methods can reduce the life  
18 expectancy of NIBCO's PEX tubing?

19          A. Yes.

20          Q. Such as?

21          A. Could you be specific, please.

22          Q. What installation practices would you  
23 consider to shorten the expected life of NIBCO tubing?

24          A. Well, if you leave the tubing lying around  
25 in the sun for a while you're hauling pipe around or

1           during the installation, that could deteriorate the  
2           pipe.

3           Q.   What else?

4           A.   If you have significantly increased pressure  
5           over time, that can lead to creep rupture of the pipe  
6           or burst rupture of the pipe if the pressures are high  
7           enough. We talked about some of this yesterday.

8           Q.   Uh-huh.

9           A.   If you have excessive bending in pipe, it  
10          can accelerate the rate of any cracks that might be  
11          growing through the pipe, thereby speeding up the time  
12          to failure. Is there something more specific that you  
13          would like to discuss?

14          Q.   Can you think of any more?

15          A.   There may be others. If you poke it with a  
16          nail, it'll leak. If you cut it with a box cutter, it  
17          could leak. If you have something specific you'd like  
18          to discuss, I'd be happy to.

19          Q.   Can excessive bending induce a crack?

20          A.   Under certain circumstances, anything is  
21          possible, sure.

22          Q.   Would that be an unusual circumstance?

23          A.   Excessive bending, yes.

24          Q.   Well, I'm talking about excessive bending  
25          inducing a crack. In your mind, would that be a

1 farfetched idea?

2 A. Well, it's not a given that it will. It  
3 can, particularly if the pipe is under-crosslinked.  
4 If there's some other anomalous condition going on, if  
5 there's a stress riser sitting there, sure. Over  
6 time, it can. It doesn't mean it will, but it can.

7 Q. Okay. What about running the tube too close  
8 to like a hot source of something, can that reduce the  
9 life expectancy of the tubing?

10 A. If you were to run it in the path of a gas  
11 exhaust for a water heater for example, where it's  
12 exposed to extended periods of elevated temperature,  
13 yes, that can accelerate the degradation of the  
14 product.

15 Q. What about failing to allow for expansion  
16 and contraction, could that cause premature failure in  
17 a system?

18 A. Typically more so for fittings than for the  
19 pipe. But it's a practice that we discourage. We,  
20 you know, put in expansion loops in PEX systems to  
21 minimize the stresses, though it's usually a bigger  
22 factor for fittings than for pipes.

23 Q. And a failure to allow for expansion and  
24 contraction of the tubing can cause a fitting to  
25 prematurely fail?

1           A. It puts unusual stresses on the fitting and  
2           certainly it can contribute to failure in those  
3           components.

4           Q. And unusual stress was one of those things  
5           we talked about as part of the stress corrosion  
6           cracking and unusual stress might make that more  
7           likely to happen?

8           A. These would be applied stresses. Where you  
9           have a situation where PEX is run short, there's  
10          cyclic stresses however. So it would manifest  
11          typically as a different type of failure from what we  
12          have shown in this case.

13          Q. Could -- did you say cyclic or cyclic or are  
14          those the same thing?

15          A. Tomato and tomato, pronounce it however you  
16          want.

17          Q. Can cyclic stresses result in stress  
18          corrosion cracking or a manifestation of that?

19          A. Not -- if there's a crack growing, it would  
20          influence the growth of it. But cyclic stress in and  
21          of itself would not be sufficient to cause stress  
22          corrosion cracking, no.

23          Q. And if there's a crack growing and this kind  
24          of cyclic stress, you know, increased the rate with  
25          which it happened, it would look the same in the end,

1 wouldn't it?

2           A. Not necessarily. The type of loading that  
3 you get when you have short pipe tends to be more  
4 reminiscent of fatigue-type loading and it would  
5 manifest a little differently on the fracture surface.

6           Q. Okay.

7           A. You would tend to get a mixed-mode failure  
8 on the fracture that we did not see in this case.

9           Q. Okay. So there are aspects of water quality  
10 that could reduce the life expectancy of NIBCO's 1006  
11 tubing. Is that fair?

12          A. Yes.

13          Q. And higher chlorine concentrations might do  
14 that. Is that right?

15          A. If you had very high levels of chlorine.  
16 The product is designed for use in chlorinated potable  
17 water so those chlorine levels, based upon the  
18 chlorine resistance testing that we have been  
19 discussing here this morning, that test I believe uses  
20 a chlorine level of 4.4 parts per million if I'm not  
21 mistaken. Let me verify that.

22                 The chlorine level in this particular test  
23 report that I'm looking at, which is NSF report number  
24 514910-04, the chlorine level for that test was  
25 4.4 milligrams per liter. Published literature



1 commonly holds that chlorinated potable water may have  
2 chlorine 4 parts per million in the United States so  
3 to get an unexpected result, the chlorine level would  
4 need to be substantially higher than that.

5 Q. Localized stresses can cause NIBCO's 1006  
6 PEX piping to prematurely fail, can it not?

7 A. If you have to crimp the pipe or something  
8 like that, yes.

9 Q. Okay. Or bend it too sharply across a  
10 joist?

11 A. The pipe is advertised as being bendable and  
12 flexible. It's also advertised as being abrasion  
13 resistant and suitable for burial applications where  
14 it would be expected to impinge upon rocks and so  
15 forth so I would have to disagree with that. The  
16 product is being held out as being very tolerant to  
17 scratches and rubs and localized surface deformation  
18 and it's advertised as being bendable and flexible.

19 In my experience with other PEX products,  
20 that should not be problematic and in fact, some of  
21 NIBCO's marketing materials, they demonstrate with  
22 photos, piping being simply bent in some of those  
23 cases at or near or over or against wooden components  
24 and various other impediments.

25 Q. Let's talk about F2023 again.

1                   **A. I'm sorry. Which -- which document are you**  
2                   **referring to?**

3                   Q. I haven't handed it to you. I'm going to  
4                   hand you a document we'll mark as Exhibit 18?

5                   (Smith Exhibit Number 18 was marked for  
6                   identification.)

7                   Q. All right. I have handed you a document.  
8                   We've marked it as Exhibit 18. This is a copy of  
9                   F2023-05. And is it your understanding that this  
10                  would have been the standard that was in place at the  
11                  time CPI submitted its tubing samples to NSF?

12                  **A. Yes.**

13                  Q. And what is F2023 generally?

14                  **A. It's a standard ASTM standard test method**  
15                  **for evaluating oxidative resistance of crosslink**  
16                  **polyethylene tubing and systems to hot, chlorinated**  
17                  **water.**

18                  Q. When we looked at those test reports earlier  
19                  that were submitted to CPI by NSF, they contained an  
20                  extrapolated time to failure based on this test  
21                  method. Is that right?

22                  **A. I believe that to be correct, yes.**

23                  Q. If you could please -- well, let me first,  
24                  before we turn the page, with respect to the failures  
25                  that you observed in plaintiffs' homes here, did you

1 observe any kind of discoloration of the tubing at the  
2 fracture surface?

3 A. When you say at the fracture surface, I need  
4 you to be a little more specific. Do you mean on the  
5 fracture surface or the interior surface of the pipe  
6 where the cracks were occurring?

7 Q. Let's call it the failure area.

8 A. Again I need you to define what you're  
9 referring to.

10 Q. Does that term mean anything to you as an  
11 expert, "the failure area"?

12 A. It's a subjective term that does mean  
13 something to me that may be different from what it  
14 means to you or someone else so I would like to make  
15 sure we're on the same page before I answer your  
16 questions.

17 Q. Tell me what it means to you.

18 A. To me, it's the localized area around the  
19 failure. But the magnitude of that area would depend  
20 upon the context upon which we're discussing that.

21 Q. Let's use your definition. Did you observe  
22 any discoloration of the tubing in the plaintiffs'  
23 homes in the -- around the failure area?

24 A. Yes.

25 Q. Okay. And what colors did you observe?

1           A. I believe.

2           Q. What color did you observe?

3           A. It varied from pipe to pipe. Do you have a  
4 specific pipe you'd like to refer to?

5           Q. No.

6           A. Okay. So it varied.

7           Q. Can you recall seeing any specific colors or  
8 any specific types of discoloration?

9           A. Most of them exhibited a white, chalky  
10 appearance to some degree or other, some more so than  
11 others.

12          Q. Okay.

13          A. There was at least one pipe sample that  
14 exhibited some brown deposits that are discussed in my  
15 report. I don't recall where those deposits were  
16 relative to cracks that were in the pipe as we sit  
17 here. There was another pipe, again I don't recall  
18 where this was relative to the leak in the pipe, but  
19 it exhibited a discrete, round patch of what appeared  
20 to be dried organic material.

21                 There was no cracking right under that  
22 patch. I do recall that. I don't know how close it  
23 was to any cracking that may have been in the pipe.  
24 And then many of the pipes exhibited some light tan  
25 deposits that are typically seen as a result of water

1           **deposits.**

2                   Q.   Okay.   All right.   Turn the page and I'd  
3                   like to direct your attention to number five on page  
4                   two of this document.   And it refers to significance  
5                   of use.

6                   **A.   Okay.**

7                   MR. SHAMBERG:   Significance and use.

8                   MR. KUHLMAN:   Significance and use.   Thank  
9                   you.

10                  Q.   Okay.   And I just want to read you this and  
11                  I want you to tell me if you agree with the statement  
12                  generally.   It says, the performance of a material or  
13                  piping product under actual conditions of installation  
14                  and use is dependent upon a number of factors  
15                  including installation methods, use patterns, water  
16                  quality, nature and magnitude of localized stresses  
17                  and other variables of an actual operating hot and  
18                  cold water distribution system that are not addressed  
19                  in this test method.   As such the extrapolated values  
20                  do not constitute a representation that a PEX tube or  
21                  system with a given extrapolated time to failure value  
22                  will perform for that period of time under actual use  
23                  conditions.

24                  **A.   Okay.**

25                  Q.   Do you agree with that?

1           A. I agree that installation conditions and the  
2           condition of the pipe itself can cause the performance  
3           to vary, yes. And I would agree generally with what  
4           it's saying, yes.

5           Q. Okay.

6           A. However, if this is what you were referring  
7           to earlier when you say the regression analysis  
8           contemplates that, I think that would be a  
9           misrepresentation of this language. This standard  
10          itself is simply saying, hey, there's more to it  
11          that's not being represented in this test and that the  
12          conditions may vary. It is not accounting in some  
13          miracle way for some difference or taking those  
14          differences into account in calculating a predicted  
15          life value, which is what I believed you were  
16          asserting before.

17          Q. I don't think that's what I said, but as a  
18          practical matter, we're not talking about that anymore  
19          and we're not going to ask her to go back and find it.

20          A. Okay. That's fine.

21          Q. So let's just move forward. Okay. So the  
22          test method acknowledges that there are factors and  
23          actual installations that can lead to a tubing not  
24          lasting for the same amount of time that's listed in  
25          the result of the test. Fair?

1                   **A. Correct.**

2                   Q. And so the fact just generally speaking that  
3 piece of tubing fails before its anticipated life  
4 doesn't mean that the test method itself is invalid?

5                   **A. Not in and of itself, no.**

6                   Q. Okay. Is it your position, as an expert in  
7 the plastic piping industry, that F2023 is an invalid  
8 test to determine if tubing is sufficiently able to  
9 resist oxidative degradation?

10                  **A. No. It is my opinion as an expert that it**  
11 **is unwise for a manufacturer to assume that meeting**  
12 **the standard and getting certification provides**  
13 **necessarily some assurance that their product will**  
14 **perform in a similar manner in service. And it's an**  
15 **ill-advised approach for a manufacturer to assume that**  
16 **their product will be a quality product if they merely**  
17 **conform to the standard.**

18                  Q. So is it your position that mere conformance  
19 to a standard does not mean that a product is of any  
20 degree of quality?

21                  **A. I didn't say any degree. I said of**  
22 **sufficient degree.**

23                  Q. Okay.

24                  **A. I'm sure there are aspects of the pipe that**  
25 **are made perfectly in conformance to standards and**

1 will perform as intended. For example, wall  
2 thickness, generally the wall thickness over the NIBCO  
3 pipes didn't vary very much and generally met the  
4 standard and whether it did or didn't appreciable  
5 influence these failures.

6 However, the stabilization in these products  
7 was found to vary widely in a variety of tests. It  
8 was found to vary widely when different colors of pipe  
9 were subjected to this test, which in and of itself  
10 was telling the manufacturer something really  
11 important that I think they would have been wise to  
12 have paid attention to.

13 Q. Ultimately --

14 A. It's --

15 MR. SHAMBERG: Hang on a second, Kevin.

16 Were you done with your answer?

17 A. It's a mistake for a manufacturer to assume  
18 that meeting standards ensures that they have made a  
19 quality product that will perform as they expect it to  
20 during service. They have a higher level of  
21 responsibility to monitor that product and design it  
22 and to think for themselves about whether the minimum  
23 required for that standard is going to be good enough  
24 for their product or not. These standards don't limit  
25 the manufacturer to merely passing the standard. They



1           have the latitude to exceed it and to go beyond what  
2           is required for the standards and they have an  
3           obligation to do that if that's what's necessary to  
4           ensure that their product will perform as advertised.

5           Q. Now, at the time this test method was in  
6           place in 2005, if a manufacturer went too far above  
7           and beyond on their dependent list, they get penalized  
8           and their tubes fail. Right?

9           A. I don't believe that that was the case.

10          Q. But that's true though. Right?

11          A. There were certainly other -- well,  
12          according to the terra cotta pipe, they could have  
13          gone as high as 78 years and passed without a problem  
14          and yet the red pipe was only 44 years.

15          Q. That's a different issue, isn't it?

16          A. So they have an opportunity, without getting  
17          to that point, so please don't raise that to suggest  
18          that --

19          Q. Well, we weren't talking about the years.

20          A. -- they didn't have opportunity to go  
21          higher.

22          Q. We're talking about the upper predicted  
23          limit, not the extrapolated time to failure.

24          A. So again --

25          Q. So the failure, exceeding the upper

1 predictive limit on the test that resulted in the  
2 penalty to regression which reduced the time of the  
3 failure, the extrapolated lifetime?

4 A. I believe you're misrepresenting --

5 Q. Okay.

6 A. -- as I said before what that data shows.  
7 If you have the curves, we can talk about what data  
8 points were removed and why and what the effect was,  
9 but without that, we should not try to have that  
10 conversation from memory.

11 Q. And you're not an expert in that anyway.  
12 Right?

13 A. I have not been part of the committee that  
14 has done the regression analyses.

15 Q. Okay.

16 A. When you say you're not an expert in that, I  
17 don't know what that means.

18 Q. I'm talking about the regression analysis.

19 A. I am aware of the data points and they were  
20 removed because they were outliers.

21 Q. Okay. When this listing was transferred  
22 from CPI over the NIBCO, NSF had the ability and  
23 opportunity to audit NIBCO and its tubing products if  
24 it was so inclined like we talked about earlier.  
25 Right?

1           **A. I believe they had the opportunity to do**  
2           **that, they had the latitude to do that.**

3           Q. And over the years, NSF did review or did  
4           come in and take samples and test them for various  
5           things?

6           **A. I don't recall when NSF came into their**  
7           **facility or what tests they performed at what time.**

8           Q. Okay. And the NSF audit reports have been  
9           produced in the case so if we wanted to, we could go  
10          back and look at them and see what they did. Fair?

11          **A. I believe at least some have been produced.**  
12          **I can't guarantee they all have.**

13          Q. Okay. And as a result of NSF's audits, is  
14          it your understanding that NIBCO failed any of those  
15          audits?

16          **A. Again, I don't recall what audits were done**  
17          **or when they were done.**

18          Q. So you just don't know one way or the other?

19          **A. As we sit here today, I don't recall what**  
20          **was done when or what those results may have shown.**  
21          **What I do know is that the products at issue in this**  
22          **case are not performing very well in the field**  
23          **regardless of what those audits showed.**

24          Q. We're talking specifically about what NSF  
25          did right now, we're not talking about the performance

1 in the field.

2 **A. Okay.**

3 Q. I understand that you want to talk about  
4 that, but we're talking about the NSF audits and what  
5 you know about them or recall about them.

6 **A. Okay. And I have told you I don't recall**  
7 **when they were done or what they showed.**

8 Q. And that's okay.

9 **A. Okay.**

10 Q. I should have said that in the instructions,  
11 if you don't know the answer or you can't recall,  
12 that's okay.

13 **A. I've said that several times. I'm quite**  
14 **comfortable saying that.**

15 Q. All right.

16 MR. KUHLMAN: Let's go off the record for  
17 just one second.

18 (A recess was taken.)

19 MR. KUHLMAN: We are back on the record  
20 after a short break.

21 Q. And I'd like to ask you about some of your  
22 conclusions and before I do that I want to ask you  
23 this: Yesterday we spent quite a bit of time talking  
24 about the failure mechanism that you've described as  
25 dezincification in NIBCO fittings and I just want to

1 make sure that your opinions with respect to  
2 dezincification and the testimony that you would give  
3 on that issue would essentially be the same in both of  
4 these cases. Since we were kind of talking about some  
5 of the Meadow cases yesterday and we're talking about  
6 Cole today, I just want to make sure that testimony  
7 would be the same.

8 **A. Yes.**

9 Q. Okay. And the same with respect to clamps?

10 **A. Yes, to the extent they existed. They**  
11 **didn't exist in the Meadow case.**

12 Q. Right. But the general discussion of the  
13 stainless steel and the stress corrosion cracking  
14 mechanism and things of that nature, same testimony?

15 **A. We've seen no difference in the plumbing**  
16 **products between of the Cole case or the Meadow case**  
17 **or any of the other cases in how they failed or the**  
18 **mechanisms that are in play and the underlying defects**  
19 **associated with those.**

20 Q. Your testimony with respect to those both  
21 cases, on those failure mechanisms that you've  
22 outlined in your report, would be the same for both  
23 cases?

24 **A. Yes.**

25 Q. Okay. Great. If you could, in your report

1           that's been marked as Exhibit 15, if you could please  
2           flip back to page 90, I'd like to ask you about your  
3           opinion that's labeled number 23.

4                   **A. Sorry. I have to get to 95.**

5                   Q. I'll give you a second to read it.

6                   **A. Yes.**

7                   Q. So this opinion of yours states NIBCO knew  
8           or should have known that the incident tubing  
9           exhibited insufficient resistance to chlorine and that  
10          the tubing was likely to fail prematurely in the  
11          intended application. From the day NIBCO acquired  
12          CPI's assets in 2006, NIBCO knew or should have known  
13          that red and orange CPI PEX pipes, which were  
14          manufactured using the same formulation, same  
15          processing equipment and same processing parameters  
16          used for NIBCO's 1006 PEX pipe had failed chlorine  
17          resistance testing performed in accordance with ASTM  
18          2023 as required by ASTM F876. Do you still hold that  
19          opinion?

20                   **A. I do. The red and the orange pipe did not**  
21           **pass the chlorine test.**

22                   Q. And I'd like to ask you about this because  
23          what do you base this opinion on that NIBCO knew or  
24          should have known as of 2006 that the PEX pipes, the  
25          red and orange, failed to pass chlorine testing?

1           A. CPI performed testing that we have already  
2           gone through on those pipes, showing an extrapolated  
3           life of 44 years I believe it was if we look back, for  
4           the red pipe.

5           Q. And NSF --

6           A. And --

7           Q. -- as we talked about --

8           A. Can I finish?

9           MR. SHAMBERG: Yeah.

10          Q. Go ahead.

11          A. And in October I believe it was of 2006,  
12          Debbie Premus, who would have been the person who  
13          would have received those results at CPI, who went on  
14          to work for NIBCO from day one, sent communication to  
15          Larry Smallwood saying, hey, let's not forget, we're  
16          due for an audit on these pipes and we didn't pass  
17          that test so if they pull that pipe and they retest  
18          it, we might be in trouble.

19                 And there was a whole lot of discussion that  
20          ensued over the next number of years within the NIBCO  
21          organization and a whole lot of effort was undertaken  
22          to try to develop a backup plan because they  
23          anticipated losing the listing because of that very  
24          fact.

25          Q. As it turns out, Debbie was wrong, wasn't

1 she?

2 **A. I don't believe that she was wrong, no.**

3 Q. Now, we have looked at these NSF documents  
4 that were produced to CPI. Right? We just looked at  
5 the NSF test reports, did we not?

6 **A. We have looked at some of them.**

7 Q. And the NSF test reports that you're saying  
8 should have given NIBCO notice that there was an  
9 issue, those ultimately say that the pipes lasted  
10 longer on tests, did they not? Just answer the  
11 question.

12 **A. They show different results later, yes.**

13 Q. And they say that the red pipes lasted  
14 longer. Isn't that what they said?

15 **A. I disagree that that's what they're actually**  
16 **saying.**

17 Q. All right.

18 **A. That is what that one document said. I**  
19 **disagree that that's what a summation of all the**  
20 **evidence tells us.**

21 Q. I'll just read it.

22 **A. Okay.**

23 Q. Okay. NSF was telling CPI that and they're  
24 talking about the combined data set not complying with  
25 the requirements of ASTM F2023 and it says, quote,



1           this is a result of the tested specimens lasting  
2           longer than the original regression predicted, end  
3           quote.

4                   A. I believe you also need to look at those  
5           samples and how they failed and what they say about  
6           the failure mechanism and the way the fractures looked  
7           and whether or not they were really considered valid  
8           data points and why they were removed. That is what  
9           that document says. I believe if we delve into that,  
10          there's more to that story I believe.

11                  Q. This is what NSF was telling CPI. Right?

12                  A. That is what NSF said to CPI, yes.

13                  Q. I mean, in your experience, would NSF pick  
14          up the pipes off the test and send them back to CPI  
15          and say, hey, take a look at these?

16                  A. I don't have experience what NSF did with  
17          CPI.

18                  Q. So is it --

19                  A. Your question to me was --

20                  Q. Let me ask the question.

21                  A. Debbie was wrong, wasn't she?

22                  Q. And we'll get back to that.

23                  A. And my answer is no, I don't believe she was  
24          for a variety of reasons. My answer here or my  
25          opinion here was also not based just upon that CPI

1 test. It's based upon their empirical experience.

2 Q. What about --

3 A. When you look at --

4 Q. Okay.

5 A. When you look at the PER database for CPI  
6 and NIBCO, what you see is a history of pipe being  
7 returned early in the field, in less than ten years,  
8 with findings of oxidative degradation from NIBCO and  
9 from CPI. They concluded that the failures resulted  
10 from oxidative degradation after being in service for  
11 only a limited number of years. That is an important  
12 piece of it.

13 The communications that they had with Jana  
14 Laboratories saying, hey, there's a problem here, your  
15 pipe is not doing well in these tests, your pipe is  
16 not responding to the beam in the same way as other  
17 pipes. When you look at the summation of all of the  
18 evidence that exists in this case, not just that  
19 communication from NSF to CPI, I absolutely don't  
20 think Debbie was wrong.

21 In fact, my opinion is Debbie might have  
22 been the one who had it most right in the organization  
23 and the organization didn't listen to her when they  
24 probably should have.

25 Q. Let's talk about a couple of these things

1 real quick because I want to make sure that the record  
2 is clear here and that I understand. Okay. So you're  
3 telling me that NIBCO should have known that there was  
4 an issue with tubing based on the PERs that existed in  
5 2006. Is that your opinion?

6 **A. No, sir. I said my opinion is they should**  
7 **have considered all of that and collectively they had**  
8 **many and multiple opportunities to realize that there**  
9 **was a problem with these tubes and they ignored it.**

10 Q. And I want to break these things down.

11 **A. Okay.**

12 Q. All right. So let's talk about one and then  
13 the next and we'll just kind of click through them.

14 **A. Okay.**

15 Q. If I miss something, you can tell me and  
16 we'll circle back to it. One of the things that  
17 you're saying NIBCO should have considered in 2006  
18 that you're saying should have given it knowledge  
19 about this was failures in PEX products in early  
20 returns. Is that right?

21 **A. Correct.**

22 Q. So what's your understanding of when this  
23 particular formulation was first sold by CPI, the one  
24 that got the 1006 rating?

25 **A. I don't recall the specific date --**

1 Q. Okay.

2 A. -- not as I sit here.

3 Q. You don't know when CPI started selling this  
4 particular tubing?

5 A. I don't recall when they started selling it  
6 as we sit here today, the specific date.

7 Q. It's okay not to know.

8 A. What I do know is I said, I don't recall.  
9 It is in the evidence. I have reviewed it. Thank  
10 you.

11 Q. Okay.

12 A. They also manufactured NEXT-Pure pipe.

13 Q. Was that the same formulation all along?

14 A. It was the -- I believe the same formulation  
15 in that 2005, 2006 timeframe, yes.

16 Q. Okay. So how many samples of this  
17 formulation do you believe were returned  
18 representing -- and ending in PERs at the time NIBCO  
19 acquired CPI's assets?

20 A. I don't have the PER database in front of  
21 me. I can't answer that question as we sit here. Do  
22 you have the PER database here?

23 Q. I do not.

24 A. Okay. Then we can't answer that question as  
25 we sit here.

1           Q. I'm trying to figure out did you review that  
2           PER database and base that opinion on that at any  
3           point?

4           **A. It has contributed to my opinion, yes.**

5           Q. What was your take on it when you saw the  
6           PER database? Were there a lot of failures of this  
7           particular --

8           **A. There were.**

9           Q. As of what date?

10          **A. As of many dates over a period of many**  
11          **years.**

12          Q. But I'm talking about in 2006. What you  
13          opined here is that when NIBCO acquired these assets,  
14          it should have known and I want to know at that time,  
15          how many PERs were there?

16          **A. I don't recall how many there were, but what**  
17          **you're trying to do right now is suggest that the PER**  
18          **database alone should have been sufficient to have**  
19          **alerted them in 2006 and that is not what I said.**

20          Q. As I said, we're working through these.

21          **A. Nor is it -- but if you're going to work**  
22          **through it, you have to work through it in a manner**  
23          **that's accurate and fair. You're trying to pretend**  
24          **that each one of those should have been a standalone**  
25          **basis as of 2006. That is not accurate. That is not**

1           what I've said. That is not my opinion. And I would  
2           appreciate it if you didn't misrepresent it as such.

3                       Collectively NIBCO had more than enough  
4           experience and opportunity from certainly 2006 to the  
5           time the 3308 formulation was introduced to have known  
6           and in fact evidence indicates they did know there was  
7           a problem with this pipe. It was certainly on Debbie  
8           Premus's radar in 2006 that there was concern they  
9           might lose that certification.

10                      If you have a copy of the communication she  
11           had with Larry Smallwood, we can review specifically  
12           what she said and who she sent it to and who knew  
13           that.

14                      Q. Okay. Circling back to what NIBCO knew or  
15           should have known, at the time of the acquisition of  
16           CPI's assets, NSF has certified the tubing to be  
17           compliant with F876. Right?

18                      A. Correct.

19                      Q. And NSF had sent correspondence to CPI in  
20           June of 2005 saying the tubing at issue here is going  
21           to pass the chlorine resistance tests. Right? That's  
22           what they said?

23                      A. Correct.

24                      Q. And then the red test report comes out in  
25           November of 2005 indicating that there's a 44-year

1 extrapolated life on red product. Right?

2 **A. Correct.**

3 Q. And do you know if NSF provides copies of  
4 its technical justifications to its clients?

5 **A. I don't know.**

6 Q. Okay. Well, I can represent to you that --  
7 well, I don't even have to do that. And then after  
8 this test report comes out, NSF maintains its  
9 certification of the tubing. Correct?

10 **A. They did maintain it.**

11 Q. It stays certified?

12 **A. They did maintain it.**

13 Q. So when NIBCO acquired this tubing. It was  
14 certified by NSF to perform in accordance with the  
15 standards set in ASTM F2023 according to NSF?

16 **A. According to NSF.**

17 Q. All right. And that's something that NIBCO  
18 should have known. Right. Because they have these  
19 documents on it?

20 **A. Correct.**

21 Q. And there's this technical justification  
22 that we looked at and if you could just flip back to  
23 it here and I'd like you to look at page NSF84.

24 **A. Okay.**

25 Q. And this is for the red. Are you able to --

1           what's that?

2                   **A. This goes behind here?**

3                   MR. SHAMBERG: Yeah.

4                   Q. Yeah.

5                   **A. Okay. Pages 80 and 81 I'm missing.**

6                   Q. Right. And there are certain materials that  
7                   were removed from the NSF production, for the purposes  
8                   of this exhibit, that dealt with other products and  
9                   some communications. All right. Well, anyway -- and  
10                  as of the date of the acquisition of these assets,  
11                  NIBCO would only have known about failures that would  
12                  have been reported to CPI. Right?

13                  **A. Not necessarily.**

14                  Q. Okay. So it's your opinion that someone may  
15                  have purchased CPI -- well --

16                  **A. NIBCO sold NEXT-Pure tubing prior to their**  
17                  **acquisition of CPI so they may well have had knowledge**  
18                  **of failures in NEXT-Pure pipe. I have seen failures**  
19                  **in NEXT-Pure pipe that failed in an identical manner**  
20                  **to these.**

21                  Q. But sitting here right now, you can't tell  
22                  me how many PERS there were for this formulation at  
23                  the time of the acquisition?

24                  **A. No.**

25                  MR. SHAMBERG: Objection. Asked and



1 answered.

2 Q. All right. And you also mentioned the Jana  
3 report. Are you talking about the Jana report from  
4 2007 that addresses some failures around North  
5 Carolina, around Charlotte?

6 A. We have talked about many Jana reports and  
7 there are many Jana reports that are important to me  
8 in this case and that have influenced my opinions.  
9 Which Jana report specifically are you wanting to  
10 discuss?

11 Q. You referred to an early Jana report that  
12 should have given NIBCO some notice that its tubing  
13 wasn't performing properly.

14 A. There have been many reports from Jana that  
15 I would be referring to when I say that over a variety  
16 of years.

17 Q. Okay. But which ones existed back in 2006?

18 A. I don't recall specifically as we sit here.  
19 If you have the Jana reports, I will be happy to look  
20 through them. I don't recall the date of every Jana  
21 report. I recall the contents of what stood out to  
22 me. I don't recall the dates.

23 Q. Okay. What's the first Jana report that you  
24 can recall NIBCO receiving?

25 A. I don't remember the dates of Jana reports.

1           If you have some reports, I would be happy to review  
2           them.

3           Q.   Which one do you believe should have formed  
4           NIBCO's knowledge about -- and I'm talking  
5           specifically as to when they had knowledge of an issue  
6           with its tubing.

7           A.   As we sit here today, I do not recall the  
8           dates for Jana reports.   If you have the reports, I  
9           would be happy to review them.   I'd be happy to review  
10          them.   NIBCO also had the ability to do testing  
11          anytime, anyplace they wanted to to understand their  
12          product.   So they had the ability to evaluate their  
13          product beyond what was required for certification  
14          standards.   And they may or may not have done that.  
15          They may or may not have exercised the option to  
16          further evaluate their product.

17                It appeared to me that they really didn't  
18          put much effort into designing a quality product or to  
19          understanding their product before they went into the  
20          manufacturing business for PEX pipe, that their focus  
21          was indeed merely on passing the standard tests, just  
22          get the listing so that we can sell pipe, and that  
23          there really was no demonstrated effort of any  
24          appreciable attempt to understand the pipe early on  
25          and to make sure that they were in fact making a

1           quality product early on.

2                       So part of my opinion for the early work is  
3           not based on what they did do, it's based on what they  
4           didn't do that they could have done and should have  
5           done.

6                       Q. All right. Your opinion, number 24 is --

7                       A. I'm sorry. What are you looking at now, the  
8           report, my report?

9                       Q. Back to the report, page 90. It talks about  
10          safer alternative designs. Now, those designs  
11          wouldn't necessarily be available to NIBCO, would  
12          they? I mean, a manufacturer is not just going to  
13          give up its trade secret design to PEX tubing, is it?

14                      A. Every PEX manufacturer develops their  
15          design.

16                      Q. Right.

17                      A. There were other PEX companies making more  
18          robust products at the time NIBCO was making these.  
19          NIBCO had the same access to the information that  
20          these other PEX manufacturers used to develop their  
21          processes.

22                      Q. At the same time --

23                      A. No, they didn't just hand them their  
24          process, but NIBCO had the same opportunity to develop  
25          their process that these other companies had.

1           Q. At the time, in 2006, are you aware of a  
2           different manufacturer that was making PEX C with a  
3           higher level of chlorine resistance?

4           A. I don't know what the chlorine resistance  
5           was of other PEX C manufacturers. I do know how  
6           Uponor's products were performing at that time using a  
7           PEX A process and I know that PEX C was not the only  
8           crosslinking process that was available to NIBCO.  
9           NIBCO also had the opportunity to choose a PEX A  
10          process or a PEX B process, which are most commonly  
11          employed in the PEX industry in part because they  
12          don't tend to be as problematic as the PEX C process.

13          Q. And there are differences in those products,  
14          right, PEX A, PEX B, PEX C?

15          A. There are. They have different properties  
16          and different methodologies for producing them.

17          Q. And NIBCO was manufacturing a PEX C and  
18          that's the choice they made?

19          A. That's correct, they chose the PEX C  
20          process.

21          Q. And are you aware of any alternative design  
22          for a PEX C product that was being used at this time,  
23          in 2006?

24          A. Yes.

25          Q. Whose?

1           **A. Hewing. Hewing.**

2           Q. Hewing. How do you spell that?

3           **A. H-e-w-i-n-g.**

4           Q. All right. And what about that was -- what  
5 was that rated at?

6           **A. I don't know their chlorine resistance**  
7 **rating. I know empirically their product was not**  
8 **performing in a manner similar to NIBCO's. That was**  
9 **another Uponor company.**

10          Q. Where is it used?

11          **A. It was in Germany. They were in Germany.**  
12 **It was manufactured in Germany. I don't know where**  
13 **throughout Europe they distributed the product.**

14          Q. In Europe do they primarily use chlorine as  
15 a disinfectant?

16          **A. They do use chlorine as a disinfectant but**  
17 **not necessarily in the same degree as the U.S.**

18          Q. And do you have access to Hewing's warranty  
19 claim information?

20          **A. Not as we sit here today, no.**

21          Q. And when did Hewing start selling its PEX C  
22 product?

23          **A. I don't know. Before I started with Uponor.**

24          Q. How much before?

25          **A. I don't recall. I don't know.**

1 Q. How many years of warranty claims data had  
2 you reviewed in 2006 for Hewing?

3 A. I haven't reviewed their warranty claims  
4 data. I have spoken with their technical people on  
5 occasions. I worked with their technical people.

6 Q. When?

7 A. When I worked for Uponor.

8 Q. Have you spoken with them recently?

9 A. No, not recently.

10 Q. Have you spoken to them about their  
11 experience with PEX C as of 2006?

12 A. I have reviewed test data generated by Jana  
13 Laboratories comparing the response of their PEX C  
14 pipe in comparison to NIBCO's pipe. Would you like to  
15 look at that?

16 Q. That wasn't my question.

17 A. That's what I have done most recently.

18 Q. So sitting here right now --

19 A. And other manufacturers as well.

20 Q. Do you have any data that shows that Hewing  
21 pipe is performing better in the field than NIBCO's  
22 pipe?

23 A. I have empirical data through the PEX  
24 industry, my knowledge with other folks in the PEX  
25 industry.

1           Q. Who specifically have you spoken to about  
2           Hewing's performance in the PEX industry?

3           A. What I know from the PEX industry is that  
4           NIBCO's PEX C pipe is commonly viewed as the problem  
5           pipe in the industry and that there are other PEX  
6           manufacturers, including three or four that Jana  
7           analyzed and compared to NIBCO's product, that not  
8           only has demonstrated different field experience based  
9           upon common knowledge in the industry but also that  
10          has revealed different performance when subjected to  
11          oxidation induction time testing. It's revealed a  
12          higher degree of stabilization and a more uniform  
13          distribution of stabilization within the pipe wall.

14          Q. What was the safer alternative design NIBCO  
15          could have used in 2006?

16          A. They could have chosen PEX A or PEX B as  
17          their crosslinking process for starters.

18          Q. So instead of manufacturing your product,  
19          you want NIBCO to just make a different product?

20          A. They could have used a different process  
21          that is more forgiving to someone who doesn't really  
22          understand what they are doing, which they have stated  
23          in internal documents, internal communication that's  
24          been produced in the case. They also could have  
25          chosen a higher molecular weight resin than what they

1        did. We talked through some of this yesterday and  
2        it's already in the record. They could have chosen a  
3        higher molecular rate resin. They could have chosen a  
4        stabilizer with greater mobility. They could have  
5        crosslinked the pipe to a higher degree rather than  
6        aiming for the minimum required to pass the test.

7            Q. And all of these things take time to test --

8            MR. SHAMBERG: Were you done?

9            Q. -- how they're going to respond --

10          THE WITNESS: No.

11          Q. -- to the irradiation process, do they not?

12          MR. SHAMBERG: Before you answer that  
13          question, were you done answering his previous  
14          question with respect to alternative design?

15          THE WITNESS: I was not.

16          MR. SHAMBERG: Go ahead and finish.

17            A. There were a variety of things that they  
18            could have done. They also could have paid higher  
19            attention to ensuring that they were not selling pipe  
20            that had extrusion lines and stress risers at the  
21            interior surface of the pipe that promote crack  
22            initiation, though that's not the design issues that  
23            are problematic in this case. It is part of their  
24            process however, the design of the process.

25            There are a host of things that they could



1 and should have done and they absolutely could and  
2 should have devoted more time and attention to upfront  
3 development work on their product and their process  
4 that they purchased from CPI to make sure that indeed  
5 it was going to perform as intended before they put  
6 that pipe out into service. And that didn't happen.  
7 All that should have been part of the design process.

8 Q. How much of that had CPI done?

9 A. I haven't seen much of anything produced in  
10 the case related to what CPI did.

11 Q. So how do you know one way or the other what  
12 CPI did?

13 A. I don't know what CPI did. The concern in  
14 this case is what NIBCO did. NIBCO is the one who  
15 sold those pipes, not CPI. So if NIBCO relied upon  
16 information that CPI did, it should have been in the  
17 file produced.

18 Q. Do you know if that information was  
19 requested?

20 A. I believe that it was through the questions  
21 that were asked.

22 Q. Do you know if that information was made  
23 available by CPI if it still even existed?

24 A. I do not know. If it didn't exist however,  
25 NIBCO most certainly would have been remiss in just

1           **assuming that it was fine.**

2           Q.   Even though --

3           **A.   If I were --**

4           Q.   -- though the pipe is certified by NSF to  
5           meet the applicable standard?

6           **A.   Absolutely.   Obtaining a certification**  
7           **clearly is not sufficient for a manufacturer to assume**  
8           **that a product will perform well during service, it's**  
9           **just not.**

10          Q.   What is point of the certification?

11          **A.   The point of the certification is you can't**  
12          **sell pipe into the potable water industry without it**  
13          **being certified.**

14          Q.   Why not make a certification that results --

15          **A.   And NIBCO knew that.**

16          Q.   -- in a product that's good enough?

17          **A.   That's for the standards committees to**  
18          **address in developing their standards.   I wasn't part**  
19          **of those committees who develop standards so I can't**  
20          **speak to that.**

21          Q.   But you're on this committee now.

22          **A.   Yes, I am now, but I wasn't then.   But I**  
23          **wasn't then.   And there are many PEX manufacturers out**  
24          **there, Uponor being one of them, who absolutely**  
25          **doesn't just adhere to the minimum of those standards.**

1 When you aim for the minimum required in every area,  
2 crosslinking, stabilization, chlorine resistance, when  
3 you're aiming for the minimum to pass the test or  
4 you're achieving the minimum to pass the test, what  
5 you get on the backside is a really unforgiving  
6 product that has essentially no factor of safety.

7 There are things that happen in an industry  
8 that we know will happen whether we tell folks for  
9 that not to happen or not. We know that someone's  
10 going to turn their water heater up to a setting C if  
11 there is a setting C. A responsible manufacturer  
12 develops a product that's designed to withstand those  
13 reasonably anticipated circumstance.

14 I've had the opportunity to work for two  
15 different manufacturers and both of them held that  
16 view. We don't just design our product to meet the  
17 minimum standards, we design it to be a quality  
18 product that will perform well. And if we need to  
19 exceed these standards to do that, then that's what  
20 we're going to do. NIBCO clearly didn't adopt that  
21 view or put forth significant effort to make that  
22 happen.

23 Q. Well, I want to ask you a specific question  
24 and I would like an answer to this question. Why have  
25 you not raised what you believe to be inadequacies

1 with this test method to the F17 committee on plastic  
2 piping systems?

3 A. Because I've been too busy to take an active  
4 role in that committee in the past year and a half. I  
5 have devoted all of my time and attention to  
6 supporting my existing clients and my business and I  
7 have not taken an active role in this committee to any  
8 appreciable extent recently. I do have concerns and I  
9 may indeed address those concerns. But my role is not  
10 to be the savior for the PEX industry. My role is not  
11 to single handedly try to ensure that these standards  
12 are adequate and so my business comes first.

13 Q. How long have you been on the committee?

14 A. I have been on the committee since roughly  
15 2009 I believe or 2010.

16 Q. How long have you been working on these  
17 cases involving NIBCO?

18 A. A while.

19 Q. How long?

20 A. I don't recall when I first became involved,  
21 2013 I believe, 2014, something to that effect. The  
22 past few years.

23 Q. Over the years -- you mentioned that your  
24 business comes first -- how much have you been paid to  
25 work on cases involving NIBCO PEX?

1           A. I can't tell you that as we sit here to  
2           date. My fee schedule is included in my reports and  
3           the rate's changed from year to year.

4           Q. How much have you been paid by the Cole  
5           plaintiffs?

6           A. I don't know as we sit here today.

7           Q. \$100,000?

8           A. Potentially.

9           Q. \$200,000?

10          A. Probably not but potentially over the course  
11          of four years.

12          Q. What about the Meadow plaintiffs?

13          A. Well, that would be collectively, not a  
14          specific.

15          Q. Over the last few years, it could be as high  
16          as \$200,000 for these two cases?

17          A. Possibly for four years, possibly.

18          Q. And then what about Christianson?

19          A. I don't recall.

20          Q. 100,000?

21          A. Possibly.

22          Q. 200,000?

23          A. For this case alone, I have pretty much  
24          worked -- well, there have been times from January  
25          through March where I worked full time plus just on

1           this case. For a period of three or four weeks, I was  
2           working just about around the clock on this case. So  
3           yes, a tremendous number of hours have been invested.  
4           I don't know what the total bill comes to.

5           Q. When did you form the opinion that NIBCO PEX  
6           was insufficiently stabilized?

7           A. I don't know when I finally came to that  
8           conclusion. But to be very clear, there is no  
9           obligation on me to express my concerns with this  
10          committee. I participate in the committee on a  
11          volunteer basis as I see fit if. And it is a  
12          committee of people.

13          At some point, I will likely raise concerns  
14          with this committee about what is going on, but it  
15          would not be while active litigation relating to this  
16          is going on. I would not -- I would not be able to  
17          relay findings related to what I'm doing when there's  
18          active litigation pending. I can raise concerns  
19          later, but I would not do that as long as there is  
20          active litigation pending where I'm testifying as an  
21          expert.

22          Q. How much were you paid in Mi Casita?

23          A. I don't recall what I was paid.

24          Q. 50,000?

25          A. No, it was not that much. And out of what

1           was received came expenses and paying other people as  
2           well. So we need to be very clear, when you talk  
3           about what were you paid, that's not money going in my  
4           personal pocket. Whatever the company is paid governs  
5           a lot of things and goes to a lot of things beyond  
6           just my time.

7           Q. Sure. But over the last few years, the last  
8           three or four years, would it be safe to say that your  
9           work on cases against NIBCO has generated your company  
10          \$500,000?

11          A. I don't know what it's generated for the  
12          company and I don't know what portion would actually  
13          be profit versus expenses. What I do know is that we  
14          have invested a tremendous amount of time. I do know  
15          that we have covered a lot of expenses as well in  
16          relation to that. And there are accounting records  
17          that I would be happy to produce --

18          Q. Okay.

19          A. -- if need be. There's certainly nothing to  
20          hide in what has been billed. And I think I can  
21          fairly say what my company has billed has been less  
22          than what ESI's experts have billed looking at the fee  
23          schedules.

24          Q. Well, that would be great. If you could  
25          send those to the attorneys, that would be super so we

1           could take a look at them.

2                   **A. Once they're done. These folks have not**  
3           **been billed since January so I will have to prepare a**  
4           **bill.**

5                   Q. Fair enough. Isn't it true --

6                   MR. SHAMBERG: Just for the record, we're  
7           not necessarily agreeing to produce these. That's a  
8           discussion we can have between the lawyers.

9                   MR. KUHLMAN: Okay. All right. Let's take  
10          a five-minute break, put our orders in and then go  
11          back on the record while we wait for lunch. Is that  
12          fair?

13                  MR. SHAMBERG: Yes.

14                  THE WITNESS: Okay.

15                  (A recess was taken.)

16                  Q. We are back on the record after a short  
17          break. And before the break, we were talking a little  
18          about F2023 and chlorine resistance testing and I'd  
19          like to circle back and ask you a few more questions  
20          about F2023. Would you agree that F2023 is the  
21          industry-accepted method for testing new products for  
22          chlorine resistance?

23                  **A. I agree that it is a standard that is used**  
24          **in the industry to attest for chlorine resistance. It**  
25          **may not be the only one used.**



1           Q. Is there a different standard used in the  
2 industry to test for chlorine resistance that's  
3 accepted by certification entities?

4           A. I have not looked for that. I don't know  
5 the answer to that. This is the standard that's  
6 specified in ASTM 876.

7           Q. Are you aware of any other standards that  
8 address chlorine testing in PEX pipe?

9           A. I haven't looked. There very well maybe.

10          Q. Where would you look to find that?

11          A. I don't know where you would look to find  
12 that. There are a variety of places you could look.

13          Q. Where could I look?

14          A. On the Internet, in a technical library.  
15 You could reach out to the agencies themselves I  
16 suppose.

17          Q. Where would you look as the expert?

18          A. I haven't looked. That's not the focus of  
19 what I have been asked to do.

20          Q. That wasn't my question. My question is:  
21 As an expert, where would you look for an industry  
22 acceptable chlorine resistance test?

23          A. I would look in any manner of places  
24 including the ones I've cited. I may go to ASTM. I  
25 may go to ISO. I may go to PPI. I may go to IATMO.

1           I may go to UL. There are any number of places that  
2           you could go that I would go.

3           Q. To your knowledge, do any of those entities,  
4           UL or any of the other entities you just listed,  
5           IATMO, et cetera, do any of those entities have their  
6           own standard method for testing PEX pipe for chlorine  
7           resistance?

8           A. I don't know. I haven't looked at what  
9           those particular agencies are doing in quite a while  
10          related to chlorine testing. I don't know what they  
11          do or don't today.

12          Q. To your knowledge, is F2023 generally  
13          accepted in the industry as an appropriate way for  
14          testing PEX tubing for chlorine resistance?

15          A. I can't speak to what other people view  
16          about the standard. The standard is what is required  
17          for ASTM F876. And those in the PEX industry are  
18          required to conform to ASTM F876 so they are testing  
19          to it because they're required to test to it. Whether  
20          or not they view it in a certain way is not for me to  
21          speculate on.

22          Q. And the plumbing codes require PEX tubing to  
23          comply with F876 in order to be used. Right?

24          A. Correct.

25          Q. So, I mean, it's safe to say that in the

1 plumbing industry, if you're going to manufacture PEX  
2 pipe, you have to test that tubing. If you're going  
3 to sell it to the public at least, you have to test  
4 that tubing to F2023 for chlorine resistance?

5 **A. Correct.**

6 Q. Are there any other test methods that test  
7 for chlorine resistance that are similarly required  
8 for a manufacturer to sell its products to the public?

9 **A. Specific to PEX plumbing pipe?**

10 Q. Yes.

11 **A. Not that I am aware of, but I haven't looked**  
12 **to see if other standards are available, which I think**  
13 **was your earlier question. I am not aware of other**  
14 **chlorine-related standards that they are required to**  
15 **test to.**

16 Q. Okay. So the industry standard for testing  
17 for chlorine resistance of PEX pipe is F2023. Is that  
18 fair?

19 **A. That is what is incorporated into F876**  
20 **today, yes, that's correct.**

21 Q. And that's the standard in the industry?

22 **A. That is a standard in the industry.**

23 Q. And with respect to chlorine testing, it is  
24 the standard in the industry. Fair?

25 MR. SHAMBERG: Object. Asked and answered.

1           A. That is a standard in the industry. I  
2 wouldn't call it the standard. It is a standard in  
3 the industry.

4           Q. What is the standard in the industry for  
5 chlorine resistance testing?

6           A. I don't know that there is the standard. I  
7 wouldn't know what that would mean. It is a standard  
8 that is referenced in ASTM F876.

9           Q. Any other standards for chlorine resistance  
10 testing that is referenced in any of the ASTM  
11 standards?

12          A. Which specific version of the ASTM standard  
13 are you referring to?

14          Q. Any of them that you can think of as the  
15 expert in this case.

16          A. I haven't looked at every ASTM standard.  
17 What I have focused on in this case is the standard  
18 applicable to this case only.

19          Q. Okay.

20          A. And there are years of revisions that are  
21 applicable to this case only so my focus has been on  
22 ASTM standards that carry up through about 2012 and  
23 not beyond.

24          Q. Starting in what year?

25          A. Back through about '05 to '07 depending on

1           what standard we're looking at. They have different  
2           revision years. Some of them were introduced prior to  
3           '06.

4           Q. Okay. So from roughly 2005 to 2007 to 2012,  
5           are there any ASTM standards that utilize a different  
6           method for testing for chlorine resistance aside from  
7           F2023?

8           A. I don't know. I know that that's what's  
9           called out for in ASTM F876. Could be other ASTM  
10          standards that could be applicable to PEX pipe or  
11          polyethylene materials related to chlorine testing.  
12          This is what is called out in ASTM 876 and that has  
13          been the focus of my efforts in this case, F876 and  
14          its requirements.

15          Q. Okay. So to comply with F876, which is  
16          required for selling pipe in the plumbing industry,  
17          F2023 is the method to test for chlorine resistance?

18          A. It is a method to test for chlorine  
19          resistance that is called out in ASTM F876. There are  
20          other methods that are called out to test various  
21          properties. I believe within --

22          Q. Are there other methods called for testing  
23          for chlorine resistance that are relevant to F876?

24          A. Not that are called out in F876.

25          Q. Okay. Why didn't you do the F2023 test on

1 NIBCO's 1006 tubing?

2 A. We're not set up to do that test.

3 Q. You could pay someone to do it. Right?

4 A. We could. We don't choose to. There isn't  
5 sufficient time to do that, for one, in the timing  
6 that's involved in most of these cases and there's no  
7 need to do it. We have data already that tells us how  
8 the pipe that's at issue in this performed in that  
9 test so there's no added benefit to repeating that.  
10 And you can't repeat it on field-returned pipe and  
11 expect to get the same result now that it's oxidized  
12 and cracked and so forth. So the results would not be  
13 meaningful.

14 Q. Now, this case has been pending for a number  
15 of years at this point. And I believe you've probably  
16 been working on this case for years. How long does it  
17 take to run an F2023 test?

18 A. I have not been working on this case for a  
19 period of years. I have worked off and on through a  
20 period of years. We really only began working in  
21 earnest with any actual product late last year. We  
22 only retrieved field-return product and had permission  
23 to do destructive testing beginning in January of this  
24 year so we weren't permitted to do any destructive  
25 tests all through January of this year.

1 Q. Well, don't you have unused 1006 NIBCO PEX  
2 pipe?

3 A. I have three inches of it.

4 Q. That's all that's left from the coils you  
5 had?

6 A. I didn't have the coils. The coils that  
7 you're referring to are at Christianson Plumbing.

8 Q. Did you make any effort to get new or unused  
9 NIBCO 1006 tubing so that you could run an F2023 test?

10 A. That would have been made back in 2006 or  
11 2005? I'm not aware that any such tubing exists  
12 anywhere outside of Christianson so no.

13 Q. Did you try to get any whether it be 2006  
14 or --

15 A. Absolutely not. There would be no need to  
16 do that testing or spend the money to do that testing.  
17 There would be no benefit whatsoever so no I would  
18 not, as a responsible expert, recommend to my client  
19 that they do that nor would I waste their time for me  
20 to even try to find pipe like that. That would be  
21 pointless.

22 Q. Are you aware of any published literature  
23 outlining how you can assess if a used piece of pipe  
24 was insufficiently stabilized at the time of its  
25 manufacture?

1                   **A. Could you ask that again, please?**

2                   MR. KUHLMAN: Can you read it back.

3                   (The question was read by the court  
4 reporter.)

5                   **A. Yes, I am aware of published literature that**  
6 **cites different methods of evaluating field-return**  
7 **products to assess the distribution and degree of**  
8 **stabilization using a variety of different techniques.**

9                   Q. Okay. What techniques do these published  
10 articles -- are they articles?

11                  **A. There's a variety of different pieces of**  
12 **literature.**

13                  Q. Like what?

14                  **A. For example the ASTM standard that we looked**  
15 **at yesterday related to using differential scanning**  
16 **calorimetry to look at the OIT of field-return**  
17 **product. That's addressed in that particular standard**  
18 **guideline.**

19                  Q. No. That standard guideline is actually to  
20 assess shelf-aged implants made of ultra high weight  
21 molecular polyethylene, aren't they?

22                  **A. That's the title of it, but if you look**  
23 **deeper into that standard, there's also language**  
24 **addressing the assessment of field-return products.**

25                  Q. So it's out of someone's body and then you



1 do the test on it?

2 A. There are actually two separate paragraphs,  
3 one deals with products that are removed from bodies  
4 and the other paragraph deals with similar products  
5 that were not used for surgical implants and that were  
6 not removed from bodies.

7 Q. And that standard indicates that the results  
8 cannot be used to determine the life expectancy of the  
9 product. Right?

10 A. Correct.

11 Q. Okay. What other articles?

12 A. There are any number of articles that have  
13 been published, including some that have been  
14 published by NIBCO's experts in this case, documenting  
15 various methods of evaluating field-return product to  
16 assess the degree of oxidation and residual  
17 stabilization in those products.

18 Q. Okay. And what do those articles call for?

19 A. Using primarily FTIR and OIT in combination,  
20 using bend-back testing, using scanning electron  
21 microscopy, using energy dispersive x-ray  
22 spectroscopy -- I'm sorry, stereo microscopy, the  
23 methods that we have used in this case, the very same  
24 methods.

25 Q. Is it your position that those articles

1 describe a manner of determining the level of  
2 stabilization at the time of manufacture?

3 A. No. And that's not what we have done  
4 either. The methods are used to do a relative  
5 comparison for stabilization within the pipe wall and  
6 to assess what we see that would indicate that a loss  
7 of stabilization has occurred. If you detect  
8 oxidation, insufficient stabilization has occurred at  
9 that location.

10 Oxidation can't occur until you achieve loss  
11 of stabilization. So the detection of the oxidation  
12 tells you, by definition, you've lost stabilization at  
13 that location. So it's a combination perhaps of  
14 measuring residual stabilization, but more importantly  
15 evaluating the presence of oxidation and oxidative  
16 damage.

17 Q. So when the pipe is sold, it's not  
18 insufficiently stabilized at that time because there's  
19 no oxidation present at that point?

20 A. No, that's not a correct statement.

21 Q. What of your tests address what the level of  
22 stabilization was at the time the tubing was  
23 originally manufactured?

24 A. None of our testing was designed or able to  
25 predict what the level of stabilization was at the

1           time of manufacture. That's why we haven't relied  
2           merely upon the testing that we performed for the  
3           conclusions that were rendered in this case.

4                       To know what was happening at the time the  
5           product was manufactured, we have to compare what  
6           we're seeing now with field-return products to what we  
7           learned through testing that was done by other folks  
8           on as-manufactured product. It's when you compare  
9           them that you begin to understand what was happening  
10          at the time of manufacturing and how that relates to  
11          what we see now in the field-return product.

12                   Q. So is it your opinion that there was an  
13          insufficient level of antioxidants in the tubing, the  
14          NIBCO 1006 tubing?

15                   A. It's my opinion that the level of  
16          antioxidant that was added, the type of antioxidant  
17          that was added, the type of resin that was used, the  
18          degree of crosslinking in the material, the  
19          distribution for all of that and any dezincification  
20          that may have occurred during the manufacturing  
21          process to change that picture culminated in the  
22          production of a pipe that had insufficient residual  
23          stabilization for the intended application.

24                   Q. What is insufficient residual stabilization?

25                   A. It was not able to resist oxidative failure

1 in less than ten years during the field. And that is  
2 not in keeping with what the pipe was advertised to be  
3 able to do. It was advertised as being resistant to  
4 aggressive water. It was advertised as being suitable  
5 for chlorinated water. It was advertised as being  
6 bendable and flexible and able to withstand pressures  
7 up to 85 PSI and temperatures up to 140 degrees F for  
8 a period of at least 50 years when it was in potable  
9 water applications, properly installed in accordance  
10 with the chlorine test.

11 Q. Would you agree that F876 provides for tests  
12 that address stabilizer functionality in PEX? Right?

13 A. There is a test for stabilizer  
14 functionality, yes.

15 Q. Okay. And NIBCO's tubing, as extruded and  
16 manufactured, the 1006 PEX pipe, met those  
17 requirements?

18 A. The sample that they tested for the  
19 conformance testing met those requirements, yes.

20 Q. And NIBCO's PEX pipe, as manufactured, met  
21 the requirements for oxidative stability in potable  
22 chlorinated water applications per the analysis that  
23 NSF performed on the 2023 testing. Right?

24 A. Based upon the documents that we have  
25 discussed, they were able to obtain a certification as

1           such, yes, for that pipe that was tested.

2           Q. And that is an accepted methodology, looking  
3 at the testing requirements of F876, for determining  
4 if a piece of PEX pipe, as manufactured, is  
5 sufficiently stabilized for use in potable water  
6 applications, is it not?

7           A. It's suitable for determining that the pipe  
8 that was tested for the purpose of that certification  
9 test met those requirements. We would be remiss in  
10 assuming that that means that all other pipes  
11 manufactured by NIBCO over the next three, four, five,  
12 six years would behave similarly, as demonstrated by  
13 the fact that in order to pass this test, they also  
14 had to show sufficient levels of crosslinking and yet  
15 we now know that approximately 22 percent of these  
16 field-return pipes do not show sufficient levels of  
17 crosslinking and would not have passed that test and  
18 would not have achieved certification had they tested  
19 that pipe instead.

20           We also know that 60 percentish,  
21 approximately 60 percent of the pipes that were  
22 removed from service did not conform to the  
23 dimensional requirements of the standard. And when we  
24 compare those results to results that were measured by  
25 NIBCO at the time of manufacture, we find that they

1           were similar and that they also did not conform  
2           dimensionally at the time of manufacture for both  
3           outer diameter and out-of-roundness.

4                       So clearly pipe that met all of these  
5           requirements at the time it was tested cannot be  
6           assumed to later meet those same requirements. That's  
7           part of the reason companies plan to do audits or  
8           organizations plan to do audits and why companies have  
9           quality assurance programs in place.

10                      So, you know, if we know that dimensions  
11           varied over time and did not always conform and we  
12           know that the degree of crosslinking varied over time  
13           and did not always perform -- conform to the standard,  
14           we certainly should not assume that just because the  
15           pipe they tested for the certification test, which  
16           was, what, fewer than a dozen pipes over a period of a  
17           few years, that those pipes were representative of all  
18           pipe manufactured by NIBCO.

19                      Q. Okay. Well, according to the standard,  
20           that's how you determine if a tubing that's  
21           manufactured is good enough. Right? I mean, the  
22           standard includes provisions for workmanship and  
23           audits and other things that a manufacturer needs to  
24           do in order to comply with the standard. I mean,  
25           that's the purpose of the standard. Right?

1           **A. That is what the standard states, that the**  
2           **manufacturer must meet these requirements. The issue**  
3           **in this case is not whether or not the pipe conformed**  
4           **to the standard.**

5           Q. And you --

6           **A. The issue in this case is that it failed to**  
7           **perform as represented during service. And those are**  
8           **two very different things.**

9           Q. And for this case, for your analysis for  
10          Cole and the Meadow class actions, you didn't actually  
11          look at any new and unused NIBCO PEX tubing. Is that  
12          fair?

13          **A. I don't believe that is fair.**

14          Q. You did some work on unused tubing in the  
15          Christianson matter?

16          **A. And I relied upon that test.**

17          Q. And you rely on that now --

18          **A. Yes.**

19          Q. -- but as far as what you have done in this  
20          case, like in the last couple months that you  
21          described, none of that dealt with new and unused  
22          tubing?

23          **A. I'm trying to recall if I dealt with any new**  
24          **or unused tubing. Let me think about that for just a**  
25          **moment. We did have samples of pipe that was held out**

1           to be new, unused tubing that I would have visually  
2           inspected.

3           Q.   Okay. And the tubing samples for the most  
4           part that you're describing here is as either not  
5           complying with the dimensional requirements or  
6           crosslinking, the ones that you actually measured --

7           A.   Yes.

8           Q.   -- those were all pipes that had been used  
9           in a potable water system for at least some period of  
10          time. Right?

11          A.   The ones that I evaluated in this case, yes.

12          Q.   Yeah. And we're talking about how many  
13          samples, like 150?

14          A.   By what? When you say how many samples --

15          Q.   That you looked at -- of tubing samples that  
16          you looked at in these two cases?

17          A.   I don't recall the specific number, but it  
18          was probably somewhere between 150 and 180. I don't  
19          know.

20          Q.   Okay. And not all of them had crosslinking  
21          issues. Right?

22          A.   Not all of them did, but many of them did.

23          Q.   Well, to be fair, you did not do  
24          crosslinking on all 150 of those samples. Right?

25          A.   No, certainly not.



1 Q. You did a small subset --

2 A. Correct.

3 Q. -- for crosslinking? And how did you pick  
4 which ones you wanted to use?

5 A. I would have to go back and look, but the  
6 aim of it was to pick a variety of sizes, a variety of  
7 years of manufacture, a variety of colors and a  
8 variety of homes to make sure that we were making the  
9 samples that were tested as broadly representative of  
10 the full scenario as possible.

11 Q. Okay. And that 22-percent number you tossed  
12 out, you'd agree that you can't take that number and  
13 extrapolate it out to NIBCO's, you know, entire  
14 universe of manufactured tubing. You can't say that  
15 22 percent of all the tubing had crosslinking issues.  
16 Correct?

17 MR. SHAMBERG: Objection. Asked and  
18 answered.

19 A. Not necessarily, no.

20 Q. Okay.

21 A. That's reflective of what we have examined  
22 from the field.

23 Q. Yeah. And how can you determine, as an  
24 expert, by looking at 150 tubes, which of the millions  
25 of feet that were sold are going to exhibit

1 characteristics that would lead them to not conform to  
2 the standard F876 at the time they were sold?

3 **A. I don't understand your question.**

4 Q. Can you say with any degree of certainty  
5 that a set percentage of NIBCO's tubing failed to  
6 comply with F876 at the time it was sold?

7 **A. No. It would depend on what parameter you**  
8 **were looking at and so forth. We can look at the**  
9 **dimensional records that were produced and we can make**  
10 **some assessments based on that from the dimensional**  
11 **inspection record to establish a percentage of what**  
12 **pipes may not have conformed to the dimensional**  
13 **requirements. We know those numbers.**

14 Q. And the dimensional requirements that we're  
15 talking about, if there's a difference in, you know, a  
16 few percentage points off of the permitted dimension,  
17 is that going to contribute to an oxidative  
18 degradation issue?

19 **A. It can influence it.**

20 Q. Okay. Do you believe that to be the root  
21 cause in any of the failures in this case?

22 **A. No.**

23 Q. And you mentioned that the sample tested  
24 with respect to the F2023 tests passed the test.  
25 Right?

1           A. Some of the samples tested passed the test  
2           and some of the samples tested did not pass the test.

3           Q. Are you --

4           A. Which sample are you referring to?

5           Q. Are you referring to the red one when you  
6           say the one that didn't pass the test?

7           A. That is one of the ones that didn't pass.  
8           The orange one also didn't pass. They didn't pass on  
9           multiple occasions with multiple different samples  
10          with multiple different resins so which sample are you  
11          referring to?

12          Q. Now, are you taking the position that NSF  
13          incorrectly interpreted the data when it concluded  
14          that the red pipe actually passed and met the  
15          standard?

16          A. I'm not asserting anything about NSF or its  
17          data beyond that passing that test does not really  
18          necessarily tell you anything applicable to how it's  
19          going to perform during service.

20          Q. Right. But you're making a point --

21          A. That's the crux of this.

22          Q. You're making a point to say not all of them  
23          passed and we've looked at the report from NSF  
24          concluding that it passed so I'm trying to understand  
25          if you're telling me that you disagree with NSF's

1 assessment of the data.

2 A. No. I'm telling you that you refer to that  
3 as though there was one pipe. You said the pipe that  
4 was tested.

5 Q. Well, okay.

6 A. And I'm telling you there were multiple  
7 pieces of the pipe that were tested, red and orange,  
8 on more than one occasion, both with Total's resin and  
9 with Equistar's resin, that did not yield a 50-year  
10 predicted life when subjected to that test. So it  
11 wasn't just one sample, it wasn't just -- there is no  
12 the sample --

13 Q. Well --

14 A. -- with regard to orange and red pipe.

15 Q. The CPI 1006 PEX pipe that passed the F2023  
16 test, is it your opinion that if you look at that pipe  
17 and follow the methodology that you've come up with,  
18 that it would yield the result that that pipe was  
19 insufficiently stabilized?

20 A. Not in and of itself. There's more to the  
21 story. There's more to stabilization, too.  
22 Stabilization is the entire process of what you do to  
23 make a robust product. It involves more than just the  
24 chlorine resistance. It also involves the degree of  
25 crosslinking, it involves the resin itself, it

1 involves a lot of different things. And we know that  
2 over time those things varied in this product.

3 Q. Well, let me ask you this: You've said that  
4 there's a lot of things that go into stabilization and  
5 one of those was the resin and one of those was the  
6 extrusion and the manner of manufacturing and so on  
7 and so forth. I'm asking about a specific piece of  
8 pipe.

9 A. Which pipe?

10 Q. The terra cotta tubing samples that were  
11 subjected to F2023 testing and showed an extrapolated  
12 life of 78 years. Is it your opinion that if you took  
13 that tubing sample that showed 78 years and subjected  
14 it to your methodology, that it would suggest that  
15 that particular piece of tubing was insufficiently  
16 stabilized?

17 A. I haven't evaluated that piece of tubing. I  
18 don't know what that piece of tubing would have shown.  
19 I don't think anybody knows what that piece of tubing  
20 would have shown from what I have seen that's been  
21 produced in this case. I don't think that single  
22 piece of tubing was evaluated for that. I don't think  
23 it was evaluated for that from what we've seen.

24 What we do know is that the samples that we  
25 have evaluated show insufficient stabilization.

1           Whether that sample did or not really isn't the issue  
2           in this case. The issue in this case is what these  
3           products that are now in the field that are failing  
4           are showing and that's what we focused our efforts  
5           on.

6           Q. What about all the millions of feet that  
7           aren't failing?

8           A. I don't know that they aren't failing. My  
9           guess is many or most of them probably are from what  
10          we've seen.

11          Q. But you don't know. Right?

12          A. Based on my empirical experience, I bet I  
13          could make a predictive estimate of what we're seeing  
14          out there.

15          Q. As a scientist, you can't tell me right now  
16          that all of the millions of feet of NIBCO tubing in  
17          the United States are currently failing?

18          A. What I can tell you as we sit here right now  
19          is that all of the millions of feet of tubing are  
20          formulated and manufactured using an identical  
21          formulation in an identical process to the pipes that  
22          we have examined in multiple cases in nauseating  
23          levels of detail and all of those have consistently  
24          shown that they are oxidizing during service due to  
25          insufficient stabilization and defectively formulated

1 design of manufacture for the tubing.

2 I can tell you based on that, within a  
3 reasonable degree of scientific certainty, that all of  
4 those millions of feet of pipe will exhibit that same  
5 defect whether they are failing or not. They are  
6 exhibiting the same defect. They were sold with the  
7 same defect.

8 Q. So how can you say that all these millions  
9 of feet of tubing out there exhibit the same defect  
10 and yet you can't tell me if the terra cotta tubing  
11 that was subjected to the F2023 test method and showed  
12 extrapolated life expectancy of 78 had the same issue?

13 A. What I can tell you is that that same  
14 formulated pipe --

15 Q. Yeah.

16 A. -- that same manufactured pipe, manufactured  
17 using the same process, failed in less than ten years  
18 in the Plisko home in a dramatic way and that it  
19 failed due to oxidative degradation. There's no  
20 question about that. That is the failure mechanism.  
21 That is what has happened. That is what led to  
22 failure in that home and it happened in short order.

23 Failures began appearing after only six  
24 years in service with the same formulation as the pipe  
25 that was tested in that chlorine test. Whether those

1 pipes were oxidized going into service nobody looked  
2 at. NIBCO should have looked. I have seen no  
3 evidence that they did. They should have evaluated  
4 those samples they should have known that before they  
5 put those pipes into service.

6 I believe that Jana did some testing that  
7 certainly hinted at that, that certainly suggested  
8 there was a problem with insufficient distribution of  
9 stabilization within the wall of that pipe. And yet  
10 the red flag still didn't go up to say, hey, maybe we  
11 better be looking a little closer at this and  
12 listening to what's been told to us. Jana did express  
13 concern about the field performance of these products.

14 At any point through the time the 3308  
15 formulation was introduced, NIBCO had the opportunity  
16 to stop selling this defective pipe. They had lots  
17 and lots and lots of notice from different people that  
18 there was a problem with this pipe and they kept  
19 selling it anyway and now it's out there. And we base  
20 our conclusions on what we're seeing happen  
21 empirically with that product in part, coupled with  
22 all of this other evidence that exists with testing  
23 that was done during this whole process.

24 Q. So is it your opinion that that piece of  
25 terra cotta tubing that was subjected to the F2023



1 test was defective?

2 A. Yes, yes, it is.

3 Q. And was it insufficiently stabilized, in  
4 your opinion?

5 A. Yes. Based upon what we've seen with our  
6 empirical experience and what we know, yes.

7 Q. So how long does a pipe sample have to last  
8 before it's good enough in your mind?

9 A. NIBCO warranted it for a period of 25 years  
10 if only NIBCO products were used in the system or for  
11 10 years if other products were used in conjunction  
12 with it. I think for most homeowners, based on my  
13 experience, they would then conclude that it should  
14 have a life of at least 25 years.

15 Q. At least 10 or 25 years depending on how  
16 it's put together. Right?

17 A. Well, a knowledgeable homeowner would  
18 reasonably conclude that using other people's products  
19 isn't likely to affect the pipe itself. Maybe they  
20 would conclude ten. Some of them I think would still  
21 conclude 25. But at a minimum they would expect it to  
22 last ten years I believe based on my experience and  
23 the pipes at issue in this case have not. And yet  
24 NIBCO did not honor those warranty claims. They  
25 blamed these failures on anything but their own

1           **product.**

2           Q. You would agree with me that there are a  
3           number of homeowners who don't even know what their  
4           plumbing system is made of?

5           **A. Correct.**

6           Q. Right? Do you have PEX in your house?

7           **A. I do.**

8           Q. Do you have yellow brass fittings in your  
9           house?

10          **A. I have plastic fittings in my house.**

11          Q. What kind of PEX do you have?

12          **A. Zurn. I did not build my house I did not**  
13          **specify my plumbing system, but I have Zurn pipe and**  
14          **thus far it has performed well.**

15          Q. Well, we had a Zurn failure during an  
16          inspection in one of these houses, did we not?

17          **A. We did.**

18          Q. Is Zurn insufficiently stabilized tubing?

19          **A. I have no idea. I haven't evaluated**  
20          **Zurn-type pipe.**

21          Q. Why not?

22          **A. I wasn't asked to evaluate Zurn pipe. Zurn**  
23          **pipe is not at issue in this case. NIBCO pipe is at**  
24          **issue in this case.**

25          Q. There was at least one failure of Zurn pipe

1 in these houses and it failed in a similar way as what  
2 the NIBCO pipes failed in that house. Right?

3 **A. Zurn pipe may be equally defective. I have**  
4 **no idea. It may be sheer luck that my Zurn pipe has**  
5 **so far lasted 11 years. I hope not, but that's**  
6 **certainly a possibility.**

7 Q. Could it not also be a possibility that both  
8 the Zurn pipe and the NIBCO pipe are fine and there's  
9 a problem with the installation?

10 **A. Based on the evidence that exists in this**  
11 **case, absolutely not. We know with certainty that the**  
12 **NIBCO pipe is not fine.**

13 Q. That's your opinion?

14 **A. Absolutely that's my opinion.**

15 Q. All right. Let's talk about some site  
16 inspections. We've already talked about what you were  
17 looking for at the site inspections and I'd like to  
18 kind of just run through these real quick. If there's  
19 some specific pages in your report that you'd like to  
20 look at to so that you're up to speed on what we're  
21 talking about, feel free to do that. Let's start with  
22 the Meadow case.

23 **A. Do you have my site inspection?**

24 Q. I'm not looking at that, I'm looking at  
25 something different, but you're welcome to review your

1 report.

2 A. Okay. I don't know what pages you're  
3 referring to in my report.

4 Q. Okay. I'm not referring to your report.  
5 Okay. Do you remember when you conducted your  
6 inspections in the Meadow house? Does November of  
7 2016 sound about right?

8 A. Sounds approximately right.

9 Q. Okay. And --

10 A. I don't know if it was October or November,  
11 but it sounds approximately correct.

12 Q. All right. Let's talk about the Plisko  
13 house first. Do you know when that home was built?

14 A. It's documented in my reports for the Plisko  
15 residence, the Meadow case, and I don't have those  
16 here in front of me.

17 Q. Okay.

18 A. So off the top of my head, no, I do not.

19 Q. My reports show that the house was built  
20 about 2008. Does that sound about right?

21 A. I don't remember. If you have a copy of my  
22 report, I'd be happy to reference it.

23 MR. SHAMBERG: Do you have the exhibit?

24 MR. KUHLMAN: Yeah.

25 Q. I mean, you have a copy of your report, too.

1 It's Exhibit 2.

2 MR. SHAMBERG: This is the Cole report.

3 **A. This is the Cole report. I don't have the**  
4 **Meadow report here today.**

5 Q. They're around here somewhere. Here they  
6 are.

7 MR. SHAMBERG: Yeah, that's all I'm saying.

8 Q. Yeah, I'm sorry. I thought these were  
9 sitting in front of you.

10 **A. No. Thank you.**

11 Q. Sorry. I thought you were looking at it.

12 **A. No. That's the Cole report.**

13 MR. SHAMBERG: That's Cole.

14 Q. What page is that in the Cole report, the  
15 one I have?

16 MR. SHAMBERG: Four.

17 MR. KUHLMAN: Page four.

18 MR. SHAMBERG: In Cole, yeah.

19 MR. KUHLMAN: It wouldn't have taken me that  
20 long to find it.

21 Q. I think the discussion of site inspections  
22 in this report starts on page 22.

23 **A. Which report are you referring to?**

24 Q. The Meadow report.

25 **A. Okay. I'm at page 22.**

1 Q. Okay. How many leaks had occurred at the  
2 Plisko residence to the best of your knowledge?

3 A. As of what date, the date of this report?

4 Q. As of the date of your inspection.

5 A. As of the date of the inspection, seven I  
6 believe.

7 Q. Has that number changed since then?

8 A. It has.

9 Q. How many leaks are there now?

10 A. I believe she's had least two additional  
11 leaks since then that I'm aware of. She may have had  
12 more, but those are the ones that I'm aware of.

13 Q. So a total of nine leaks?

14 A. Yes.

15 Q. And how many samples of those nine leaks  
16 have you been able to collect?

17 A. I would need my visual inspection database  
18 possibly. Just a moment here. My report is not  
19 broken out specifically by homeowner so it's going to  
20 take a while for me to find specific numbers like this  
21 if that's what you're asking for. And I don't know  
22 that the documents that you provided will be  
23 sufficient for me to tell you home by home exactly how  
24 many samples we had. That's documented elsewhere in  
25 things that I produced to NIBCO.

1           Q. Okay. Have you reviewed ESI's report where  
2 they talk about the site inspections?

3           **A. I have reviewed the Meadow report. I have**  
4 **viewed portions of the Cole report, but I have not**  
5 **reviewed the Cole reports in their entirety.**

6           Q. Okay. All right. Well, I'm not sure what  
7 documents you would need. Just do your best with my  
8 questions and we'll try to get through them. ESI  
9 noted that there were -- at the time of the  
10 inspection, there were seven leaks and all of those  
11 leaks occurred in the hot water lines. Is that your  
12 understanding?

13           **A. I believe they did occur in hot water lines**  
14 **at the Plisko residence.**

15           Q. And based on the -- at the time of the  
16 fitting, there were no fitting leaks -- I'm sorry. At  
17 the time of the inspection, there were no fitting  
18 leaks in the Plisko residence. Is that your  
19 understanding?

20           **A. She had reported one prior fitting that had**  
21 **leaked.**

22           Q. And did she report that to be a NIBCO  
23 fitting?

24           **A. I don't recall. She reported that she**  
25 **believed it was a plastic fitting.**

1 Q. Okay. And are you claiming that plastic  
2 fittings in this case are defective?

3 A. No. We have not evaluated plastic fittings  
4 in this case.

5 Q. Okay. So at the time of the inspection in  
6 the Plisko residence, there had been, as reported,  
7 seven leaks in the hot water lines, no fitting leaks.  
8 Were there any leaking clamps that you're aware of?

9 A. No brass fitting leaks.

10 Q. No brass fitting leaks. Thank you.

11 A. With regard to clamps, she did not have  
12 stainless steel clamps in her home.

13 Q. Okay. And ESI put together a chart of what  
14 samples were available and which ones were not  
15 provided and so I'm going to base my questions on what  
16 they reported.

17 A. Do you have a copy of their report that I  
18 can reference?

19 Q. I can get you one over lunch at least with  
20 respect to these sections, but I don't have an extra  
21 with me.

22 A. Then I won't be able to verify the  
23 information.

24 Q. Okay. Well, if you had a copy of ESI's  
25 report, would you just agree with what they say?



1                   **A. I certainly don't agree with everything they**  
2                   **say.**

3                   Q. No. With respect to what samples were  
4                   available and what weren't?

5                   **A. It would depend on specifically what you're**  
6                   **pointing me to. I don't know if they've made a**  
7                   **mistake. Again, I would need to compare.**

8                   Q. Let's circle back to what samples were  
9                   available and what samples weren't and try to talk  
10                  about a few other things. According to ESI's report,  
11                  there were four samples that were not available either  
12                  at the time of the inspection or after the inspection  
13                  with respect to the leaks. Does that sound close?

14                  **A. I don't know the number, but not all of the**  
15                  **leaks -- not all of the pipes that had leaked were**  
16                  **available for inspection.**

17                  Q. Okay. You would agree with me that if  
18                  you're not provided a sample that leaked, you can't  
19                  perform any kind of laboratory analysis on that  
20                  sample. Right?

21                  **A. Correct.**

22                  Q. And if you're not provided a copy of that  
23                  sample, you can't take a look at it to see what the  
24                  fracture surface looks like. Right?

25                  **A. Correct.**

1 Q. And you can't do any of the other test  
2 methods on that sample that you described earlier  
3 today?

4 A. Not on a sample I don't have, no.

5 Q. Right. And the same would be true for  
6 fittings that you don't have. Right?

7 A. Correct.

8 Q. Okay. Now, when you were at the Plisko  
9 home, do you recall seeing PEX tubing connected  
10 directly to the water heater?

11 A. No.

12 Q. Do you recall there being multiple leaks, of  
13 the leaks that were reported in the PEX line, that ran  
14 from the water heater in the Plisko home?

15 A. I'm sorry. I need to back up and clarify my  
16 last answer. I did not see NIBCO pipe connected  
17 directly to the water heater. There had been a repair  
18 and there was someone else's pipe that was connected  
19 with a fitting assembly between the water heater and  
20 pipe. It did not have the copper length that should  
21 have been there and we corrected that when we left,  
22 but that was not reflective of the NIBCO pipe or the  
23 NIBCO installation. It was a repair.

24 Q. Yeah. I think the NIBCO pipe actually had a  
25 copper link on it when it was connected to the water

1 heater?

2 **A. When you ask these questions, I'm thinking**  
3 **in terms of what's at issue in this case.**

4 Q. I'm not trying my trick you.

5 **A. So thank you for letting me clarify that.**

6 Q. Okay. When you went to the inspection, the  
7 water temperature in the Plisko home was 120 degrees.  
8 Is that right?

9 **A. I don't recall what the temperature was off**  
10 **the top of my head. Let's -- I produced my inspection**  
11 **notes in this case. Do you have those available?**

12 Q. I don't know that -- let's go off the  
13 record.

14 (A conference was held off the record.)

15 (Smith Exhibit Number 19 was marked for  
16 identification.)

17 MR. KUHLMAN: Okay. We're back on the  
18 record after a short break and I'm handing you a  
19 document that's marked as Exhibit 19. And the  
20 document is labelled 2016111, on-site water chemistry  
21 testing. Did you generate this document?

22 **A. I did.**

23 Q. All right. And there are a few different  
24 pieces of information on here I want to ask you to  
25 make sure I understand this. If you look here at the

1 Plisko residence, there is -- there are three columns  
2 with temperatures listed, cold, hot and then cold.  
3 What is the -- what is the third row of cold? What  
4 does that mean?

5 **A. It's for an outside hose bit. And the only**  
6 **thing that was tested at that site was the pressure,**  
7 **the incoming water pressure to the house.**

8 Q. Okay.

9 **A. It's just noting that it was a cold water**  
10 **faucet or a cold water hose bit.**

11 Q. And then the other measurements taken were  
12 from water received from the kitchen faucet?

13 **A. Yes.**

14 Q. And cold being the cold side and hot being  
15 the hot side?

16 **A. Yes.**

17 Q. And manual temperature, what does that mean?

18 **A. I have a digital probe style thermometer**  
19 **that is an analog style thermometer that I used for**  
20 **the manual temperature. And then I also have a**  
21 **digital temperature probe, it's actually the pH probe,**  
22 **it records a digital temperature as it records the pH.**

23 Q. Okay. What is the importance of pH? Why  
24 did you take that reading?

25 **A. PH can influence the corrosion of brass.**

1           Q. Is it a lower pH increases the rate of  
2           corrosion or a higher pH increases the rate of  
3           corrosion or is it both?

4           A. It can be both depending on other water  
5           chemistry conditions. It's just a piece of  
6           information.

7           Q. What is that normal range of pH for home  
8           water like for a house's water?

9           A. pHs can vary pretty widely. I have seen pHs  
10          in the 4.something range and I have seen pH in the  
11          8.something range in potable water applications.

12          Q. Does the EPA have a range of permissible  
13          pHs?

14          A. There are a variety of agencies that may  
15          specify ranges, I'm sure the EPA does as well.

16          Q. Is there one that you believe to be safe?

17          A. I don't know what you mean by that.

18          Q. Well, at what degree, at what pH either way,  
19          high or low, does it start to influence the rate of  
20          corrosion in brass fittings?

21          A. I don't understand your question. Any pH  
22          will have some influence, positive, negative or  
23          negligible, on the performance of a brass fitting.

24          Q. Okay. But, I mean, there's a like a  
25          neutral, right, for pH?

1                   A.    7.0.

2                   Q.    And so you can have high pH, low pH. At  
3                   what point, in your opinion, does it start to become  
4                   dangerous to the performance of a plumbing system?

5                   A.    There's --

6                   MR. SHAMBERG: Objection.

7                   A.    There's no answer to that question. PH  
8                   doesn't cause dezincification corrosion. PH is merely  
9                   one parameter associated with the whole water  
10                  chemistry picture. Water chemistry doesn't cause  
11                  dezincification corrosion. Dezincification can be  
12                  likely to occur under a whole host of different water  
13                  chemistry combinations and conditions.

14                  And it's a continuum. It's not like if your  
15                  pH is above this level, this can happen and if it's  
16                  below that it won't. There are no definitions like  
17                  that, that I'm aware of, that would say it's  
18                  problematic here and not there. There is no answer to  
19                  that question that I'm aware of.

20                  Q.    What's the EPA's recommended safe range for  
21                  drinking water?

22                  A.    I don't know off the top of my head as we  
23                  sit here.

24                  Q.    Would you want to drink that pH in the 4s  
25                  that you talked about?

1           A. I wouldn't, but the gentleman who lived in  
2           that house was.

3           Q. Okay. How did you calculate oxidative  
4           reduction potential?

5           A. Using a digital probe, an ORP probe.

6           Q. Do you know what that probe is measuring  
7           when it makes that reading?

8           A. It's measuring the oxidation reduction  
9           potential of the water.

10          Q. What does that mean?

11          A. It's the potential for the water to induce  
12          oxidation. It's one more parameter of the water  
13          that's commonly measured and evaluated.

14          Q. Is a higher oxidation reduction potential,  
15          does that mean that the water is more prone to  
16          oxidation?

17          A. Yes.

18          Q. And would you expect hot water -- does  
19          temperature play a role in oxidative reduction  
20          potential or no?

21          A. ORP will vary with temperature among other  
22          things. Yes, it's one thing that could cause it to  
23          vary, not necessarily directly because of the  
24          temperature, but a number of factors in the water will  
25          vary with temperature.

1           Q. I'm looking at these numbers here and in the  
2 Plisko home, the oxidative reduction potential on the  
3 cold side is higher than the hot side and in the  
4 Meadow residence the cold side is much higher than the  
5 hot side. I'm wondering if you could explain that to  
6 me. Is that normal?

7           A. It can be. It can be. And I would also  
8 probably just want to check the numbers and make sure  
9 it's not a typo. That's a possibility. So we'd want  
10 to compare it to the field notes where I wrote them  
11 down in real time. But it's not uncommon to see  
12 variations and those variations are not directly  
13 linear with temperature alone. They're influenced by  
14 things other than just temperature as I said.

15           Q. So for example in the Plisko residence, the  
16 hot reading has a free chlorine level of .62 milligrams  
17 per liter and the cold side has a higher reading of  
18 .88.

19           A. That's typical, for a cold side to have a  
20 slightly higher level of chlorine.

21           Q. And so the extra chlorine might result in a  
22 higher ORP?

23           A. Chlorine is depleted by temperature and all  
24 of the water chemistry parameters collectively  
25 influence the ORP. Oxygen, for example, would



1           influence it. And if you look at the dissolved oxygen  
2           contents of the Meadows residence, where you see the  
3           big difference in ORP, you also see a greater  
4           difference in dissolved oxygen.

5           Q. How does .88 milligrams per liter equate to  
6           parts per million?

7           A. It would be parts per million essentially.

8           Q. Okay. What's the difference between free  
9           chlorine and total chlorine?

10          A. Free chlorine is chlorine that's available  
11          to react. Total chlorine is chlorine that is  
12          available to react plus chlorine that's already bound  
13          up with something else. So total chlorine is  
14          typically going to be higher than your free chlorine.

15          Q. Okay. And does this chart accurately  
16          reflect, to the best of your knowledge, sitting here  
17          today, the readings that you took at the Plisko  
18          residence regarding water chemistry?

19          A. They were intended to accurately reflect it.  
20          And we have proofread it, but there could be a typo in  
21          there still that has sneaked through.

22          Q. Okay.

23          A. I hope that it's as accurate as can be, it's  
24          intended to be.

25          Q. Is that also true with the Meadow and the

1           McLaughlin residences?

2                   **A. Yes.**

3                   Q. When you were at the Meadow residence and  
4                   you performed your inspection, was there any of the  
5                   original installation available to review?

6                   **A. The manifold was original. And if I**  
7                   **remember correctly, some of the original pipe remained**  
8                   **in the attic, although it was not in service.**

9                   Q. Were you able to observe any of the service  
10                  pipes in their originally installed locations aside  
11                  from the small bit that was connected to the manifold  
12                  that was visible?

13                  **A. Not that I recall.**

14                  Q. Okay. Were you able to form any kind of  
15                  opinion about the quality of the installation of the  
16                  NIBCO PEX tubing at the Meadow house from what you  
17                  were able to observe at the inspection?

18                  **A. No. It had been replaced. So we were able**  
19                  **to see what was at the manifold. We were able to see**  
20                  **what was coming off the manifold. We were able to**  
21                  **observe the temperature and pressure at the time that**  
22                  **we did the testing. We were able to evaluate the**  
23                  **water conditions at the time of the testing.**

24                  **What we have is the failed pieces of pipe**  
25                  **from the Meadow residence that we can evaluate to see**

1           if locally, at that location, there was any type of an  
2           installation-related issue that may have contributed  
3           to the leak.

4           Q.   Okay.   So the answer is no, you couldn't  
5           assess --

6           A.   For --

7           Q.   -- the quality of the overall installation  
8           of the NIBCO PEX at the Meadow home during your  
9           inspection?

10          A.   Not as a whole system, no.

11          Q.   Okay.   Tell me about these two additional  
12          leaks at the Plisko home.   Were those leaks in the hot  
13          water side or the cold water side?

14          A.   I'm sorry, where are you?

15          Q.   These are not in the report.   These are the  
16          ones that you said happened after.

17          A.   From the supplemental report, they're  
18          documented in the supplemental report I believe.

19          Q.   Do you recall if they were on the hot water  
20          side or the cold water side?

21          A.   I have no information about those leaks  
22          except that they happened.

23          Q.   Okay.   Were samples sent to you?

24          A.   It's my understanding that they are coming,  
25          but I do not have them yet.

1           Q. All right. At the Meadow residence, when  
2           you were there for the inspection, you took a reading  
3           on the temperature at 148 degrees Fahrenheit, is that  
4           right, on the hot water in the kitchen?

5           **A. I'm sorry, could you please repeat that?**

6           Q. During your inspection of the Meadow  
7           residence, you observed temperatures coming out of the  
8           hot water faucet in the kitchen of 148 degrees  
9           Fahrenheit. Is that right?

10          **A. Yes.**

11          Q. And that's in excess of what's permitted by  
12          the plumbing code with respect to this tubing. Is  
13          that fair?

14          **A. That's correct.**

15          MR. SHAMBERG: Kevin, when you have a  
16          chance, I know you're in a line here, we need a  
17          bathroom break so in the next minute or two if you  
18          can?

19          MR. KUHLMAN: No problem.

20          Q. And you also observed incoming water  
21          pressure at 92 PSI max. Is that correct?

22          **A. Correct.**

23          Q. I'm asking this question with respect to all  
24          the inspections you performed: If you observed  
25          pressures in excess of 80 PSI at a home, did you go

1 back and then take an additional pressure reading at  
2 any point after the original reading to see if it was  
3 consistent with the first one?

4 **A. No. We already have enough information to**  
5 **know that that one was high.**

6 Q. Okay.

7 MR. KUHLMAN: All right. Let's go off the  
8 record.

9 (A recess was taken.)

10 Q. All right. So before we took a break for  
11 lunch, we were looking at Exhibit 19 and we had just  
12 talked about the water results you observed at the  
13 Meadow inspection. I'd like to ask you about the  
14 McLaughlin residence. When you were at that house,  
15 you observed pressure at 85 PSI at the outside hose  
16 bit. Is that right?

17 **A. Correct.**

18 Q. And that's in excess of the amount permitted  
19 by the plumbing code. Is that fair?

20 **A. By five PSI, yes.**

21 Q. And do you know how high or how low the  
22 pressure would have gone, you know, prior to your  
23 arrival?

24 **A. We know only what we measured that day.**

25 Q. Okay. So it's over by only five PSI, but it

1           could have gone higher, it could have gone lower. You  
2           have no way of knowing?

3                   **A. Potentially.**

4                   Q. Let's do a similar run-through of the  
5           results that you observed in the Cole inspections.  
6           And if you could please turn in Exhibit 15 to page 31.  
7           Okay. First, in this table three contained on page 31  
8           of your report, there's a name listed here, Lawson.  
9           Is that someone's neighbor?

10                   **A. Yes.**

11                   Q. Whose neighbor was that?

12                   **A. Mr. McLaughlin, among other people.**

13                   Q. Okay. And how did you come in contact with  
14           someone from the Lawson household?

15                   **A. Mr. McLaughlin introduced me to them.**

16                   Q. Okay. And why?

17                   **A. It was my understanding that they also had**  
18           **had leaks in their NIBCO plumbing system.**

19                   Q. And did you actually go into -- well, did  
20           you meet with Mr. Lawson, Mrs. Lawson or both?

21                   **A. Both.**

22                   Q. So when you met with the Lawsons, did you go  
23           into their home to inspect their tubing?

24                   **A. I went into their home to receive a piece of**  
25           **tubing from them. And while I was there, I did some**

1           **basic water chemistry testing and temperature testing**  
2           **for the water.**

3           Q. Did you take a pressure reading?

4           A. I did not.

5           Q. Why not?

6           A. Because it was late and it was dark and I  
7           wasn't asked to.

8           Q. Were you asked to do temperature readings?

9           A. I requested to do that.

10          Q. Okay. And the McLaughlin house is right  
11          next door at 85 PSI as the pressure?

12          A. Correct.

13          Q. Would you expect neighbors to have similar  
14          pressures?

15          A. They may or may not.

16          Q. Okay. Did you inspect any of the tubing  
17          or -- well, were the Lawsons complaining about tubing  
18          or fittings or both?

19          A. They were complaining about tubing.

20          Q. And did you have an opportunity to view any  
21          of that tubing in its as-installed condition?

22          A. What I could see under the sink was what I  
23          inspected.

24          Q. And what you saw under the sink, was that  
25          NIBCO tubing?

1           **A. As I recall, it was.**

2           Q. Did you take any notes about the date code  
3 or anything like that on the tubing?

4           **A. I don't recall. We'd have to look back at**  
5 **the site inspection notes.**

6           Q. Did you perform any tests on that tubing  
7 that you -- actually, I believe you did -- from the  
8 Lawson house?

9           **A. I believe that we did at least a visual**  
10 **inspection from the Lawson house. I don't recall**  
11 **specifically what other tests were done for that home.**

12          Q. Okay. With respect to temperatures, you  
13 observed temperatures in excess of the permitted level  
14 by the plumbing code in the new code manual in the  
15 Peperno and the Sminkey residences. Is that right?

16          **A. I'm sorry. Would you say that again,**  
17 **please?**

18          Q. You observed temperatures, during your  
19 inspections, in excess of the amount permitted by the  
20 plumbing code during your inspection at the Peperno  
21 and Sminkey homes. Is that correct?

22          **A. Yes. We detected 144 degrees Fahrenheit at**  
23 **the Peperno home, which is 4 degrees above 140, and we**  
24 **observed 160 degrees in the hot water plumbing system**  
25 **in the Sminkey residence.**



1           Q. And then 148 at the Meadow home, which we  
2           talked about before. And when you were at the Sminkey  
3           residence for that matter the Peperno residence or the  
4           Meadow residence, did you advise the homeowners to  
5           turn their water heater down?

6           **A. I don't recall advising the homeowner to**  
7           **take any specific action. I was there to evaluate the**  
8           **systems.**

9           Q. Did you have any conversations with any of  
10          the homeowners during your systems about the manner in  
11          which their tubing was installed?

12          MR. SHAMBERG: Object to the form.

13          **A. I don't recall any specific conversations**  
14          **that I had with the homeowners regarding their system.**  
15          **My conversations with the homeowner would have been**  
16          **about their leak history.**

17          Q. In the Maloney case, there was some reports  
18          of pressures observed by the homeowner that were made  
19          to either you or to the attorney that retained you in  
20          that case. Did anything similar to that happen here,  
21          where any of the homeowners took their own pressure  
22          readings and told you about what the results were?

23          MR. SHAMBERG: Object to form.

24          **A. Not that I recall. If they did, I didn't**  
25          **rely upon any of that information.**

1 Q. Same question --

2 A. I'm sorry. If I could also back up and  
3 clarify one of your earlier questions, I believe there  
4 was a conversation with Mr. McLaughlin regarding his  
5 installation to the extent when I came out of the  
6 attic, he said did you see any problems and I may have  
7 said nothing stood out to me or something to that  
8 effect.

9 Q. Okay.

10 A. Sorry.

11 Q. That's okay. Okay. So when you were at the  
12 Boyd residence, it indicated you didn't test the  
13 maximum water pressure. Why not?

14 A. That system has been completely re-plumbed  
15 before we got there and neither I nor ESI felt the  
16 need to do that so we agreed not to do it because the  
17 system may not be representative anymore of what it  
18 was before.

19 Q. And what about the McMahon --

20 A. Same --

21 Q. -- home?

22 A. -- situation, they had also re-plumbed their  
23 home.

24 Q. So by the time you got around -- you got to  
25 the inspection at the Boyd and McMahon houses, those

1 systems had been completely repiped. Right?

2 A. Correct.

3 Q. And so given that, were you able to observe  
4 the condition of the original NIBCO installation at  
5 either of those houses?

6 A. We were able to observe portions of it,  
7 portions of the system. The hot water heater remained  
8 the same. There were certain pieces of it that were  
9 still the same. But in terms of looking at individual  
10 assemblies, no.

11 Q. Well, the -- I'm asking specifically about  
12 the NIBCO tubing installation, not like, you know,  
13 their water heater.

14 A. Well, the McMahons saved the pipe in large  
15 assembly sections. Some of them were maybe upwards of  
16 ten feet long that may have had, you know, multiple  
17 fittings in it. So, you know, portions of that were  
18 retained as assemblies for the McMahon. So in that  
19 home, yes, to some degree we were able to ascertain  
20 some conditions related to installation, though not  
21 all.

22 In the Boyd home, little or no, as I recall,  
23 pipe was available that would indicate the manner of  
24 installation, other than shorter pieces.

25 Q. In the McMahon home, were those sections of

1 tubing that you described still in the same place  
2 where they would have been when there was water  
3 running through them?

4 **A. No. They had all been moved into a garage**  
5 **area.**

6 Q. So as far as where they were and how they  
7 looked as installed, you weren't able to see that?

8 **A. Correct.**

9 Q. What do you consider to be an aggressive  
10 oxidative reduction potential for water?

11 MR. SHAMBERG: Object to form.

12 **A. There's no defined answer for that.**

13 Q. Okay. What is the level of oxidative  
14 reduction potential that is in the water used in the  
15 F2023 testing?

16 **A. In table one of F2023, it states that the**  
17 **ORP is 860 plus or minus 35 millivolts.**

18 Q. Did you observe anything that high during  
19 any of your inspections?

20 **A. Not in these installations, no.**

21 Q. Okay. Let's talk about your inspection at  
22 the McLaughlin residence. At the time of your  
23 inspection, do you have a recollection of how many  
24 leaks were reported at the McLaughlin residence?

25 **A. I believe at the time of the inspection, it**

1           **was approximately 35.**

2           Q.   Okay.  And all but two of those were in hot  
3           water lines.  Is that right?

4           **A.  I don't recall as we sit here today.**

5           Q.   Okay.  Do you recall -- did you receive 34  
6           or 35 different samples from the McLaughlins to  
7           inspect?

8           **A.  No.  We received a fewer number of samples**  
9           **from the McLaughlins and then we retrieved additional**  
10          **samples during the inspection.**

11          Q.   And how many samples did you receive from  
12          the McLaughlins?

13          **A.  I don't recall as we sit here today.**

14          Q.   Okay.  And was there evidence of non-NIBCO  
15          plumbing components used in that installation --

16          **A.  Yes.**

17          Q.   -- the original installation?  Were there  
18          any leaks in the non-NIBCO components?

19          **A.  I don't recall any leaks being identified in**  
20          **non-NIBCO components.**

21          Q.   Did the McLaughlins have a recirculation  
22          system installed?

23          **A.  I don't recall as we sit here.**

24          Q.   Okay.  Did the McLaughlins complain of any  
25          fitting or clamp leaks?

1                   A. Not that I recall.

2                   Q. So for the Meadow plaintiffs, Plisko, Meadow  
3 and McLaughlin, there were no complaints of brass  
4 fitting leaks or stainless steel clamp leaks?

5                   A. Neither Mr. McLaughlin -- Mr. McLaughlin did  
6 not have NIBCO brass fittings in his home, he did not  
7 have stainless steel clamps from NIBCO in his home.  
8 Mr. Meadow's home had been completely re-plumbed and  
9 so if there ever were any NIBCO brass fittings or  
10 clamps, those were not available for inspection. So  
11 of those three homes, the only home that had NIBCO  
12 brass fittings was the Plisko residence and they  
13 utilized copper crimp rings in that home so there were  
14 no stainless steel clamps from that home.

15                  Q. Did the Pliskos complain of a fitting leak?

16                  A. They did note they had a fitting leak, but  
17 they believed that the leak was in a plastic fitting.

18                  Q. So the answer -- when I asked the question  
19 were any of these plaintiffs complaining about a brass  
20 fitting leak or a stainless steel clamp leak, the  
21 answer is no. Right?

22                  A. None of those three have asserted a leak in  
23 a NIBCO brass fitting or a stainless steel clamp,  
24 however we do know that the Plisko brass fillings were  
25 in the process of failing, they just had not noticed a

1           **discernible leak yet.**

2           Q. And we don't know whether the Meadows had  
3           NIBCO brass fittings or not. Right?

4           **A. I don't know if the Meadows had NIBCO brass**  
5           **fittings.**

6           Q. Okay. All right. In the Cole home, in the  
7           Cole case, do you recall inspecting the Boyd  
8           residence?

9           **A. I do.**

10          Q. And are the Boyds complaining of tubing  
11          leaks, fitting leaks or both?

12          **A. The Boyds, as I recall, experienced tubing**  
13          **leaks. I would have to go back and look and see if**  
14          **they asserted any fitting issues or stainless steel**  
15          **clamps.**

16          Q. Where would you need to look?

17          **A. I would start by looking at their deposition**  
18          **testimony.**

19          Q. Okay. And at the time of your inspection, I  
20          think we covered this a second ago, the house had been  
21          completely repiped. Right?

22          **A. Correct.**

23          Q. So you weren't able to assess the  
24          installation of the NIBCO tubing?

25          **A. Beyond what we could see that remained, yes.**

1           Q. Did any of it remain in its as-installed  
2           condition?

3           A. I believe that there was still some pipe in  
4           the attic that had been left in the as-installed  
5           condition that had been simply cut at the end to  
6           remove it from service, but the rest of it was still  
7           in the as-installed condition and we retrieved some of  
8           that if memory serves me correctly.

9           Q. Okay. And the McCoy case or the McCoy  
10          residence, are they complaining about tubing, fittings  
11          or both?

12          A. I know that they have experienced multiple  
13          pipe failures in their home. Again, I would have to  
14          go back and look at their deposition testimony to see  
15          if they have actually experienced a leak in the  
16          fittings --

17          Q. Okay. So --

18          A. -- or reported a leak.

19          Q. For the Boyd residence and the McCoy  
20          residence, you're only aware of tubing complaints?

21          A. That I can confirm. I do know that the  
22          McCoy home also showed evidence of dezincification  
23          corrosion in their brass fittings, although they had  
24          not yet reported a discernible leak.

25          Q. Now, in the McCoy residence, was the



1 original plumbing still in place on the date of the  
2 inspection?

3 **A. Much of it, what hadn't been replaced**  
4 **through repairs.**

5 Q. But it had not been completely repiped?

6 **A. No. The McCoy you said?**

7 Q. McCoy.

8 **A. Yes.**

9 Q. And so were you able to obtain samples of  
10 the fittings that were in use at the McCoy house?

11 **A. We were able to retain samples of the**  
12 **components that were in use, yes, which would include**  
13 **some fitting assemblies.**

14 Q. So essentially the plumber who was out there  
15 cut out a few fittings so you could take them with you  
16 and put in new ones?

17 **A. They cut out assemblies that we identified.**

18 Q. Okay. Now, the Medders home, I think we  
19 talked a little about this house yesterday. It's  
20 connected to well water. Is that right?

21 **A. Yes.**

22 Q. And the Medders have not experienced any  
23 tubing failures true?

24 **A. They have not reported any through-wall**  
25 **leaks in their tubing.**

1           Q. So the Medders have experienced no leaks in  
2           their tubing?

3           **A. They have reported no leak in their tubing.**

4           Q. And in your opinion, has a piece of tubing  
5           failed if it hasn't leaked?

6           **A. In my opinion, tubing can be oxidizing**  
7           **without a leak being present and it can certainly**  
8           **contain the underlying defects that are at issue in**  
9           **this case without having leaked.**

10          Q. But my question was a little different. Has  
11          it failed if it hasn't leaked?

12          **A. It depends upon what the application is.**  
13          **What do you mean when you say has it failed? Has it**  
14          **failed to do what?**

15          Q. Perform.

16          **A. In what manner? Has it failed to retain**  
17          **water? It has not failed to retain water in the**  
18          **absence of a leak.**

19          Q. In the absence of a leak, the tubing  
20          continues to retain water. Right?

21          **A. In the absence of a leak, the tubing has not**  
22          **failed to retain water.**

23          Q. Okay. How do you define failure for a piece  
24          of PEX tubing?

25          MR. SHAMBERG: Objection. Asked and

1           answered. I feel like we spent 20 minutes on this  
2           yesterday.

3                       MR. KUHLMAN: I think we talked about it  
4           with fittings. We never talked about it with tubing.

5                       MR. SHAMBERG: I don't want to make her go  
6           back to yesterday but --

7                       MR. KUHLMAN: She couldn't.

8                       MR. SHAMBERG: -- we talked about it with  
9           the tubing. We'll answer one more time and that will  
10          be it.

11                      MR. KUHLMAN: Okay.

12                      A. My answers with regard to tubing would not  
13          be appreciably different from the issues that we  
14          discussed yesterday. Failure depends upon the context  
15          in which you're talking about it firstly. Secondly,  
16          my answer to that question might differ on exactly  
17          what you're asking me. There's no point at which I  
18          would necessarily say this has failed and that has  
19          not. The failure process happens over time.

20                      And these pipes are slow-crack-growth  
21          mechanisms. So if I'm seeing evidence of premature  
22          oxidative degradation and I'm seeing cracks in the  
23          wall of tubing as I did in the Medders case, then yes,  
24          I would consider it to have failed. Even though a  
25          leak had not yet occurred, it is in the process of

1           **failing. Evidence of the manifestation of the defect**  
2           **is there.**

3           Q. With respect to the Medders home, where in  
4           your report would I need to look to see the degree of  
5           oxidation that you observed in that tubing?

6           A. Define what you mean when you say the degree  
7           of oxidation in that tubing.

8           Q. Well, you said you observed oxidation in the  
9           Medders tubing. I want to know where I can look in  
10          your report to see that.

11          A. You can look in a variety of places to see  
12          that.

13          Q. Okay.

14          A. But I don't know that there's language in  
15          this report that states anything about the degree of  
16          dezincification using those terms so if you can  
17          clarify the question I'd be happy to try to point you  
18          to a specific area of the report.

19          Q. Is there something in the report that would  
20          indicate to you that there was oxidation present in  
21          the Medders' tubing?

22          A. There was oxidation present in the Medders'  
23          tubing, yes.

24          Q. And if you wanted to show someone, look at  
25          this it says there's oxidation there, what would you

1 direct them to?

2 A. I would direct them first to the stereo  
3 microscopy results where we reported observing craze  
4 cracking at the interior surface of the pipe. I would  
5 also point them to the FTIR test results and the OIT  
6 test results that support those FTIR results showing  
7 insufficient stabilization at the interior surface. I  
8 would also point them to any scanning electron  
9 microscopy that may or may not be have been done, I  
10 don't recall, at the interior surface of the pipe.

11 Q. Okay. Let me ask you about this oxidation  
12 index distribution.

13 A. I'm sorry, what are you looking at?

14 Q. The oxidative index distribution is what  
15 it's titled here. And I'm looking at the Cole report  
16 on page 61 and this is for PPX23. And I don't think  
17 that's one of the Medders homes, but I would just like  
18 for you to describe for me what this is saying.

19 A. Page 36 you said?

20 Q. Sixty-one, sixty-one.

21 A. Okay.

22 Q. So what's this big blue line that forms a  
23 diamond here.

24 A. This is a graphical representation of the  
25 oxidation index values measured at 90-degree intervals

1           around the pipe wall at the interior surface of the  
2           pipe.

3           Q.   Okay.   And so what is the 0, 2, 4, 6, 8, 10,  
4           12, 14?

5           A.   That would represent the value of the  
6           oxidation index.

7           Q.   Okay.   And what does it mean if there's a  
8           higher value?

9           A.   A higher oxidation index would indicate a  
10          higher degree of oxidation all other things being  
11          equal.

12          Q.   Okay.   And to your recollection, was the  
13          Medders' tubing experiencing the highest level of  
14          oxidation of the pieces of tubing that you inspected?

15          A.   No.

16          Q.   Okay.   Do you recall which one did?

17          A.   No, not off the top of my head.

18          Q.   Can you recall offhand what the sample  
19          numbers are for the Medders home?

20          A.   Not off the top of my head.

21          Q.   Is that something we could figure out pretty  
22          quickly?

23          A.   We can if you have -- where would you look  
24          for that?   I know where I would look for that.

25          Q.   Well, would you look in the report or would

1           you look somewhere else?

2                   **A. I would look electronically. That's the**  
3           **easiest way for me to find it.**

4                   Q. Did you test more than one sample of tubing  
5           out of the Medders home to see if it had oxidation  
6           present?

7                   **A. I don't recall how many samples of tubing we**  
8           **tested out of the Medders home.**

9                   Q. Okay. And this oxidation index is OA over  
10          NA and that's oxidation peak area over the  
11          normalization peak area. Is that right?

12                  **A. Correct.**

13                  Q. Okay. What is a normalization peak area?

14                  **A. It's a reference peak that's not affected by**  
15          **the thickness of the sample that's normally used when**  
16          **you're calculating carbonyl index in case you are**  
17          **performing transmission FTIR, which relies upon the**  
18          **thickness of the sample. In this case, we were using**  
19          **a different method, but the normalization method is**  
20          **still done when you're calculating an oxidation index.**

21                   So you take the area of a carbonyl peak  
22          that's centered around 1720 inverse centimeters and  
23          you divide that by the area under a peak of 1370  
24          inverse centimeters to calculate an oxidation index.

25                  Q. So what happens if one of those numbers is

1           really small?

2                       MR. SHAMBERG: Object to form.

3                       **A. I don't understand your question.**

4                       Q. Well, it's a ratio. Right? So you're  
5           dividing one number by another number. Right?

6                       **A. I'm not aware that those numbers trigger an**  
7           **action of any kind.**

8                       Q. All right.

9                       MR. KUHLMAN: Well, let's go off the record  
10          for five seconds.

11                      (A conference was held off the record.)

12                      Q. Okay. We're back on the record. And our  
13          investigation has revealed that the Medders' sample  
14          that was subjected to FTIR work in an effort to  
15          determine the oxidation index is sample 106. And so  
16          what I'd like for you to do is take a look down in  
17          table four on page 63, down to the discussion of  
18          sample 106.

19                      **A. Okay.**

20                      Q. All right. And so if we look at the 12:00  
21          and that would be like the top part of the tubing,  
22          right, on the ID? What's the ID again?

23                      **A. Inner diameter surface.**

24                      Q. At the 12:00 position. And then we look at  
25          the next two numbers, which represent the oxidation



1 peak area in the normalization peak area.

2 **A. I'm sorry, when you say next two numbers, I**  
3 **don't know what you're pointing to or referring to.**

4 Q. That's what I was saying, the next two that  
5 I'm referring to are the ones that deal with the  
6 oxidation peak area and then the normalization peak  
7 area. And I'll just refer to those as OA and NA as  
8 you have done here. Okay?

9 **A. You're referring to the columns in this**  
10 **table?**

11 Q. The columns in the table that refer to the  
12 OA and the NA. Are we on the same page?

13 **A. Yes.**

14 Q. Okay. So if we look at the OA for sample  
15 106, what is it for the 12:00 ID location?

16 **A. 0.0382.**

17 Q. And what exactly does that mean again?

18 **A. That is the area under the carbonyl peak**  
19 **centered at 1720 inverse centimeters in the FTIR**  
20 **spectrum at that location.**

21 Q. And what does that signify to you?

22 MR. SHAMBERG: Objection.

23 **A. I don't understand your question.**

24 Q. What does it mean, like what does this  
25 number mean?

1           **A. It's a measure of the area under the peak.**

2           **It means that the area under that peak --**

3           Q. I get that, but why is that relevant?

4           **A. -- is .0382.**

5           Q. Does that tell us anything about the tubing?

6           **A. It tells us that there's detectable**  
7           **oxidation at that location.**

8           Q. Is a higher number or a smaller number more  
9           oxidation or less oxidation?

10          **A. Generally speaking, all things being equal,**  
11          **a higher number would indicate -- a greater amount of**  
12          **area under that peak would indicate a greater level of**  
13          **oxidation.**

14          Q. Okay. And if we look over to the N -- no.  
15          The NA for this 12:00 location it's .0112. Is that  
16          right?

17          **A. Correct.**

18          Q. Okay. And so the NA is the amount under the  
19          normalization peak area. What is the NA again?

20          **A. NA is the area --**

21          Q. Right.

22          **A. -- under the normalization peak centered**  
23          **around 1370 inverse centimeters.**

24          Q. Okay. So what does that mean with respect  
25          to pipe?

1 MR. SHAMBERG: Object to form.

2 Q. Does that tell us something?

3 A. It tells us that that is the area under the  
4 peak that is centered around 1370 centimeters in the  
5 FTIR spectrum.

6 Q. Okay. Why is that relevant?

7 A. Because you use it in calculating a carbonyl  
8 index for the material at that location.

9 Q. Okay. And so then to calculate this  
10 oxidation index, we put the OA on top and then we  
11 divide it by the NA. Right?

12 A. Correct.

13 Q. And so for that one, the OA over the NA  
14 equals 3.411. Right?

15 A. Correct.

16 Q. And that number tells us what about the  
17 amount of oxidation present there?

18 A. It's merely a value.

19 Q. Okay.

20 A. It's a normalized value that is called the  
21 carbonyl index for that material. It tells us there  
22 is detectable oxidation there and it establishes a  
23 normalized value that can be used to provide a  
24 relative comparison to other locations within the same  
25 pipe.

1 Q. Okay. And if we look at the 3:00 on the ID,  
2 this OA number is 1.07 -- 1.0785. And that's the  
3 highest number on this page, is it not?

4 MR. SHAMBERG: Object to form.

5 Q. For that column?

6 **A. On this page?**

7 Q. Yes.

8 **A. Yes.**

9 Q. And if we turn the page back to the next  
10 one, page 64, it would be the highest one on that  
11 page, too. Right?

12 **A. On page 64?**

13 Q. Uh-huh.

14 **A. Yes.**

15 Q. And if we turn back to page 65, it would be  
16 the highest one on that page, too, would it not?

17 **A. No, it would not.**

18 MR. SHAMBERG: Sixty-five.

19 THE WITNESS: Oh, I'm sorry. I'm looking at  
20 page 62. Thank you.

21 **A. Yes.**

22 Q. All right. I guess it starts on 62 so let's  
23 look there, too.

24 **A. And on 62, it would not.**

25 Q. And there would be a couple entries 1.0785

1 so on that one, there would be two entries that were  
2 higher?

3 **A. Correct.**

4 Q. All right. So there were no failures, no  
5 leaks in this tubing at the Medders home?

6 **A. There were no reported leaks in tubing leaks**  
7 **in the Medders home. I'm sorry, Medders home.**

8 Q. Medders home. Is it your opinion that the  
9 Medders home showed the third highest level of  
10 oxidation for all the tubing samples that you looked  
11 at in these two cases?

12 **A. No.**

13 Q. Okay. All right. And then if we look at  
14 this on the 3:00 for PPX 106, the oxidation index for  
15 this is 44.02. Right?

16 **A. That is what's printed here, yes.**

17 Q. Okay. And if I'm not mistaken, that is the  
18 highest oxidation index of any piece of tubing that  
19 you looked at by a multiple of -- excluding the other  
20 one for PPX 106, the 26.835, that's three or four  
21 times any other one on this chart?

22 **A. Correct.**

23 Q. Why is that so high if it's not one of the  
24 most oxidized pipes that you looked at?

25 **A. Well, I'm suspicious that there may be a**

1           typo in the first column. This is generated through  
2           an Excel spreadsheet so if there's a typo there, that  
3           number would be incorrect. So based on what I'm --

4           Q. Okay.

5           A. -- seeing, I'm wondering if in our review of  
6           this, we've missed a typo. So I would want to go back  
7           and look at the number.

8           Q. If it's not incorrect, what does that say  
9           about your use of this ratio to assess the level of  
10          oxidation in a tubing sample?

11          A. It would mean that at that location,  
12          something unique had happened to cause an increased  
13          level of oxidation that was not detected elsewhere in  
14          the wall of that same sample. Perhaps there was a  
15          little rust particle sitting there at that sample for  
16          example. This was well water, which does tend to be  
17          higher in mineral deposits as a rule. So if you were  
18          to have a little metal particle sitting there, that  
19          was rich in transition metal oxide, that could cause  
20          locally a little spot of increased oxidation. So that  
21          would be the other plausible explanation that would  
22          immediately come to mind.

23          Q. What does a lower normalization peak area  
24          number represent, like does that say anything about  
25          the level of oxidation present on the tubing sample?

1                   A. Not for the normalization peak, no. That's  
2 why you normalize the data.

3                   Q. All right. So in the Medders house, they  
4 have not experienced any tubing leaks. True?

5                   A. They have not reported any leaks in the  
6 tubing.

7                   Q. All right. And in the Monica home, they  
8 have also not reported any tubing leaks. True?

9                   A. They have not, to my knowledge.

10                  Q. All right. And when you were performing  
11 your site inspection, were you able to observe the  
12 condition of the plumbing system at the Monica home?

13                  A. I have not been into the Monica home.

14                  Q. Why not?

15                  A. I was not asked to go in the Monica home and  
16 the fittings were provided to me for evaluation.  
17 Dezincification of brass was one issue in the Monica  
18 home and stress corrosion cracking of the clamps was  
19 the other issue in the Monica home and those I could  
20 adequately ascertain simply by looking at the  
21 assembly.

22                  Q. And so you didn't want to take environmental  
23 factors into consideration at all with respect to the  
24 samples that you received from the Monica residence?

25                  A. No.

1           Q. Were you aware of any litigation involving  
2           the Monica residence against the plumber who piped  
3           that house?

4           A. No.

5           Q. All right.

6           A. Neither dezincification of brass nor stress  
7           corrosion cracking of brass fittings nor stainless  
8           steel clamps is going to be appreciably influenced by  
9           the water chemistry in that system or the manner of  
10          installation beyond what we see in that immediate  
11          assembly. No anomalous condition related to the  
12          installation that would be relevant to either of those  
13          failure mechanisms was observed. Improper  
14          installation is not going to cause the fitting to  
15          dezincify.

16          Q. Let me ask you this: If a fitting is  
17          improperly installed and the crimp ring is not  
18          properly sealing that joint and that improper  
19          installation allows water to seep out of the tubing  
20          around the fitting and it gets onto a stainless steel  
21          clamp and then the chlorides dry on that clamp and  
22          there's pressure exerted on it sufficient to cause it  
23          to stress corrosion crack, would that improper  
24          installation not have an impact on the stress  
25          corrosion cracking mechanism?



1 MR. SHAMBERG: Object to form.

2 A. Not as a root cause. In the absence of a  
3 susceptible alloy, stress corrosion cracking could not  
4 happen. The copper crimp rings do not fail due to  
5 stress corrosion cracking from water escaping the  
6 assembly. Water getting out in that manner would be  
7 merely a contributing factor that could allow the  
8 underlying defect to manifest as a leak.

9 It is not the only source of calcium in the  
10 plumbing system. In the absence of adequate tensile  
11 stress, which is inherent to the clamp design, and in  
12 the absence of a susceptible alloy, which is also  
13 inherent to the clamp design, that leakage would not  
14 cause failure of a clamp. It would not result in a  
15 high-volume loss of water.

16 Q. So you're willing to assume that the  
17 stainless steel clamp came into contact with  
18 sufficient levels of chloride, without installation  
19 failure, resulting in water getting on the clamp --

20 A. First of all --

21 Q. -- for the purposes of your analysis?

22 A. First of all, I'm not assuming anything. I  
23 can look at the actual components and determine  
24 whether or not an adequate seal was achieved. When  
25 the assemblies are submitted as an assembly, I have

1 everything I need to know to look at the components  
2 and determine whether or not there was a leak in that  
3 assembly and if so, where that leak came from and  
4 whether or not the placement of the clamp influenced  
5 that leak or any other issue influenced that leak. So  
6 no, I did not make any assumptions in that.

7 That being said, I do not need to know  
8 whether or not a leak occurred to know that we have a  
9 susceptible alloy that is in a very, very highly  
10 stressed state with tensile stresses approaching the  
11 yield strength for that material, in fact exceeding  
12 the yield strength for the material, and therefore  
13 it's inherently susceptible to stress corrosion  
14 cracking in the presence of chlorides from any source,  
15 be it solder flux or sweat on a plumbing contractor's  
16 hands or masonry materials or pesticide agents or  
17 concrete curing accelerant or any of the other  
18 numerous sources of potential chlorides that would  
19 exist in a typical plumbing installation.

20 Q. So regardless of what contributes to the end  
21 result of a failure, what matters to you is the  
22 susceptibility of the alloy to stress corrosion  
23 cracking?

24 A. What we have in this case are plumbing  
25 materials that were sold in a defective condition

1           because they were inherently susceptible to premature  
2           failure by stress corrosion cracking in the presence  
3           of chlorides from any source. When you get down to  
4           looking at a clamp, you can determine if in fact  
5           chlorides are present. We did that. We verified  
6           that.

7                         And in all likelihood, they would not just  
8           come from one source. A leak can contribute to them,  
9           but it absolutely is not a necessary condition for the  
10          clamps to fail.

11                 Q. With respect to the plaintiffs in these two  
12          cases, how many of them experienced failures in their  
13          stainless steel clamps?

14                 A. Define what you mean when you say "failure"  
15          in respect to that question.

16                 Q. How do you define "failure"?

17                 A. We've talked about that ad nauseam. I  
18          believe I have answered that question several times.  
19          If you want me to answer the question you just asked,  
20          I need to be clear on what you're asking me.

21                 Q. All right. How many of these plaintiffs  
22          experienced complete breaks in their stainless steel  
23          clamps?

24                 A. Where you define "complete break" as a full  
25          separation of the clamp?

1 Q. A full separation of the clamp.

2 A. I can't recall off top of my head if the  
3 Medders residence. The Sminkey residence certainly  
4 did. I'm sorry. I'm saying Sminkey meaning Monica.

5 Q. All right. Sitting here right now, you're  
6 aware of one full-separation break that you attribute  
7 to stress corrosion cracking in the plaintiffs'  
8 residences?

9 A. I can confirm that there was at least one  
10 home that had a full-separation break. There were  
11 other cracks observed in other clamps, whether they  
12 went completely through wall and separated, I would  
13 have to look back at my photos and notes to know to  
14 ensure that I'm not confusing which clamps went with  
15 other homes.

16 There were other homes that exhibited  
17 evidence of stress corrosion cracking in those clamps,  
18 whether it had gone through wall or not at multiple  
19 locations.

20 Q. And that cracking did not result in a leak.  
21 True?

22 A. I can't speak right now to which one you're  
23 referring to, which clamp are you referring to.

24 Q. Did any of the clamps that cracked result in  
25 a leak in the plaintiffs' homes?

1                   **A. Yes.**

2                   MR. SHAMBERG: Object to form.

3                   Q. Which ones?

4                   **A. Any that would have broken completely**  
5                   **through wall would leak. The Monica residence**  
6                   **certainly had clamps that were fully fractured and it**  
7                   **would not have retained a seal.**

8                   Q. Okay. So outside of the scope of this  
9                   lawsuit, taking into consideration all of the other  
10                  houses that you've inspected and the condominiums and  
11                  so forth that had NIBCO pipe fittings or stainless  
12                  steel steels in them, how many -- in all of your  
13                  investigations, how many stainless steel clamps are  
14                  you aware of that have either cracked or suffered from  
15                  a full separation?

16                  MR. SHAMBERG: Object to form, compound.

17                  **A. This is the only case I have been involved**  
18                  **in where my scope of work included an evaluation of**  
19                  **clamps and fittings so there is no answer that I can**  
20                  **give you to that question. I am aware that other**  
21                  **cases have sometimes covered NIBCO brass fittings and**  
22                  **NIBCO stainless steel clamps and copper crimp rings,**  
23                  **but I have not been chartered with evaluating those.**

24                  Q. How many stainless steel clamps did you  
25                  inspect in your work in this case?

1           **A. I don't recall specifically. I would have**  
2           **to look at my inspection notes to know, which I don't**  
3           **believe you have produced.**

4           Q. Well, I don't have them. But do you have  
5           them with you?

6           **A. You have -- you did receive them. If you**  
7           **don't have them with you, you did receive my visual**  
8           **inspection notes.**

9           Q. Would it have been more than five?

10          **A. You also received all the metallography**  
11          **work.**

12          Q. Would it have been more than five?

13          **A. I believe that it was more than five, yes.**

14          Q. Would it have been more than ten?

15          **A. I believe that it was likely more than ten,**  
16          **yes.**

17          Q. Are your notes that you're referring to in  
18          those boxes that you have?

19          **A. No.**

20          Q. Okay. Do you think you would have  
21          inspect -- or you would have -- well, let me ask you  
22          this: When you say that you've -- let me make sure  
23          I'm asking a clear question. Have you performed  
24          metallographic analysis on more than five clamps, the  
25          stainless steel clamps, as part of your work in this

1 case?

2 A. I would need to see the metallography work  
3 that we've produced. I don't believe it's all  
4 contained in what you provided here. I think the  
5 answer is yes. I would want to see that to verify it.  
6 I don't recall the number that we -- when you say  
7 metallography, I think mounting, mounting and  
8 polishing to look at those in cross-section. I  
9 believe that we looked at more than five  
10 cross-sections. I don't recall how many of those came  
11 from distinctly different samples so we would need to  
12 clarify that.

13 Q. How many different -- distinct different  
14 samples of NIBCO's stainless steel clamps have you  
15 looked at?

16 MR. SHAMBERG: Objection. Asked and  
17 answered.

18 A. I don't as we sit here.

19 Q. And when I say looked at, I'm talking about  
20 not something that you glanced at as you were  
21 inspecting a house, I'm talking about something that  
22 was actually in the lab for you to work on. Right?

23 A. I do not know the answer to that as we sit  
24 here.

25 Q. More than ten?

1           **A. I believe you asked me that a minute ago.**

2           **Yes, I believe it to be more than ten.**

3           Q. More than 20?

4           **A. Possibly, in this case.**

5           Q. More than 30?

6           **A. I don't know.**

7           Q. More than 40?

8           **A. Probably not.**

9           Q. Okay. And you made a qualifier there of in  
10          this case. How many did you look at in other cases?

11          **A. Well, you asked generally I believe about**  
12          **stainless steel clamps --**

13          Q. Okay.

14          **A. -- without specifying NIBCO. Certainly**  
15          **during my time working at Uponor, I would have**  
16          **evaluated other stainless steel clamps.**

17          Q. With respect to NIBCO stainless steel  
18          clamps, you have inspected in the lab somewhere  
19          between 1 and 40, most likely, of those clamps?

20          **A. That's probably a fair estimate.**

21          Q. And of that 40, how many of them would you  
22          have performed the mounting and etching and  
23          metallographic work on?

24                 MR. SHAMBERG: Object to form, foundation,  
25          compound.



1           A. I have already said I don't know, as we sit  
2           here today, how many were cross-sectioned. And to  
3           clarify, I did not say that there were 40. Your  
4           question began with of the 40. I don't know that  
5           there were 40. There may have been ten. I don't  
6           know. There may have been fewer than ten. I don't  
7           know.

8           Q. Would that information be in your  
9           appendices?

10          A. That information should be discernible  
11          through the appendices.

12          Q. Okay. I do have the appendices. Is there a  
13          specific appendix that you could point me to that  
14          would tell me how many of these stainless steel  
15          clamps, the NIBCO stainless steel clamps, you would  
16          have looked at and performed metallography on?

17          A. Well, I looked at every stainless steel  
18          clamp that we had the opportunity to visually examine  
19          in the lab. They were all at least visually inspected  
20          using a stereo microscope looking for evidence of  
21          cracks in those clamps. So they were all visually  
22          inspected.

23                 In terms of how many we cross-sectioned and  
24          destructively evaluated, you would need to look at a  
25          combination of the stereo microscopy images and the

1           metallography images to see what samples were  
2           cross-sectioned and how many of them.

3           Q.    Okay.

4           A.    There were also clamps that were evaluated  
5           by scanning electron microscopy and energy dispersive  
6           x-ray spectroscopy.

7           Q.    So can I conclude from what you're telling  
8           me that with respect to the stainless steel clamps,  
9           your evaluation is based on your assessment of  
10          somewhere between 1 and 40 of those clamps?

11          A.    Coupled with my prior knowledge regarding  
12          stainless steel clamps for PEX systems and how they  
13          operate and the stresses that are subjected to those  
14          and so forth, coupled with everything else that we  
15          have looked at in this case, that's what formed my  
16          opinions. We did not form the opinions based solely  
17          upon polished cross-sections.

18          Q.    Did Uponor sell stainless steel clamps?

19          A.    They did.

20          Q.    And were they made from the same type of  
21          steel that was specified that NIBCO used for its  
22          clamps?

23          A.    They were made from austenitic stainless  
24          steel clamps in accordance with the governing ASTM  
25          standard.

1 Q. So just like NIBCO's stainless steel clamps?

2 A. I can't guaranty that the chemistry was just  
3 like NIBCO's, but they were both made to the same  
4 standard and from same general class of alloys.

5 Q. Had you concluded, when you were at Uponor,  
6 that all of its stainless steel clamps that were  
7 manufactured to that standard were defective?

8 A. As I said yesterday, I'm not at liberty to  
9 discuss what work I did at Uponor or what I may have  
10 concluded when I worked at Uponor. If you want to  
11 discuss that, we would need to put Uponor's attorneys  
12 on notice and give them the opportunity to chime in  
13 due to a confidentiality agreement.

14 Q. Did you advise anyone at Uponor that you  
15 believed these stainless steel clamps that were  
16 manufactured to the specification that they were made  
17 from an inappropriate material?

18 MR. SHAMBERG: Object to form. And I think  
19 she's already testified that she's not at liberty to  
20 divulge that information.

21 Q. You can answer the question.

22 MR. SHAMBERG: If you feel differently,  
23 yeah, if you feel differently.

24 A. My answer is I decline to answer any  
25 questions related to work I did at Uponor because I'm

1 bound by confidentiality with their work as we  
2 discussed yesterday and as I just said.

3 Q. Were you able to track down a copy of the  
4 confidentiality order?

5 A. I've not made any efforts to track down a  
6 copy of the confidentiality order.

7 Q. So regardless of whether you told anybody at  
8 Uponor about it, had you concluded in your own mind  
9 that the stainless steel that's specified in the  
10 standard is an inappropriate choice for clamps used in  
11 PEX tubing?

12 A. I don't know how to answer that question. I  
13 don't believe I have drawn any conclusions to that  
14 effect. I wasn't asked to draw a conclusion to that  
15 effect as I recall. If you would like to ask about  
16 NIBCO's clamps, I'll be happy to discuss NIBCO's  
17 clamps and any opinion I have formed related to those.

18 Q. When was the first time you became aware of  
19 the mechanism of stress corrosion cracking?

20 A. Probably when I was in college.

21 Q. Okay. And when was the first time that you  
22 became aware that that could be something that could  
23 impact the performance of a stainless steel PEX clamp?

24 A. Probably during college.

25 Q. And when did you conclude, in your own mind,

1           that the use of the stainless steel that's specified  
2           in the standard can result in failures of these clamps  
3           in service, the PEX clamps?

4                       MR. SHAMBERG: Object to form.

5                       **A. I don't understand your question. Can you**  
6           **please say that again?**

7                       Q. When did you first reach the conclusion in  
8           your mind that these stainless steel clamps shouldn't  
9           be used in PEX piping systems?

10                      **A. I don't believe I rendered that conclusion.**

11                      Q. Is that your conclusion with respect to  
12           NIBCO stainless steel PEX clamp?

13                      **A. My conclusion with respect to NIBCO**  
14           **stainless steel PEX clamps is that they are inherently**  
15           **defective in their design because they are made from**  
16           **austenitic stainless steels that are inherently**  
17           **susceptible to stress corrosion cracking in the**  
18           **presence of chlorides.**

19                      Q. So I assume, from what you just told me,  
20           that your conclusion would be the same with respect to  
21           every other clamp manufactured by every other  
22           manufacturer that complied with this standard and uses  
23           the stainless steel?

24                      **A. If they utilize the same design where they**  
25           **have similarly high tensile stresses, yes.**

1           Q. Is there a different design for stainless  
2           steel clamps aside from the one that is specified by  
3           the ASTM standard?

4           **A. There could be. I don't know. There are**  
5           **other stainless steel clamping components that have**  
6           **been used of different designs that may have different**  
7           **stress profiles associated with them.**

8           Q. And does Uponor sell a stainless steel clamp  
9           that utilizes the same design as NIBCO?

10          **A. I don't know what Uponor is selling today.**

11          Q. What were they selling when you worked  
12          there?

13          **A. They sold similarly styled clamps when I**  
14          **worked there.**

15          Q. Okay. And do you know if they still sell  
16          those today?

17          **A. I do not know if they still sell them today.**

18          Q. How can you say, as an expert, that NIBCO  
19          knew or should have known that there was an improper  
20          material selection by using this stainless steel back  
21          in 2006 when you hadn't reached that conclusion  
22          yourself as an expert in this back in 2006?

23          **A. I didn't say I hadn't reached that**  
24          **conclusion.**

25          Q. Okay. Had you concluded, in 2006, that you

1 believe these stainless steel clamps that were being  
2 sold were defective?

3 MR. SHAMBERG: Object to form.

4 A. I'm not going to address any conclusions I  
5 reached dealing with Uponor. I do have opinions  
6 regarding the failure mechanisms, but I'm not at  
7 liberty to disclose what I may have or may not  
8 discussed or concluded at Uponor. I certainly would  
9 say that as a technical person, I knew, coming out of  
10 college, that stainless steel components that were in  
11 a highly stressed state would fail due to stress  
12 corrosion cracking in the presence of chlorides.

13 Q. I'm not asking about Uponor or what you told  
14 them or --

15 A. You actually have asked about those multiple  
16 times.

17 Q. I did, but that wasn't that question. My  
18 question was: Had you determined, as of 2006, that  
19 the use of this stainless steel in these clamps was an  
20 improper material choice?

21 A. Yes.

22 Q. And did you, as an expert, advise anyone in  
23 the industry that you believed that?

24 A. Yes.

25 Q. Who?

1           **A. I'm not at liberty to disclose who I have**  
2           **shared information with under a confidential**  
3           **relationship.**

4           Q. Have you ever testified to that effect, that  
5           you believe this stainless steel material choice  
6           that's specified in the standard was improper, prior  
7           to this case?

8           **A. I don't recall.**

9           Q. Have you ever testified to the contrary --

10          **A. I would not think so.**

11          Q. -- indicating that this stainless steel  
12          choice was appropriate?

13          **A. I would not think so.**

14          Q. Have you ever evaluated a stainless steel  
15          clamp and concluded that it failed for some other  
16          reason other than stress corrosion cracking?

17          **A. Yes.**

18          Q. When was that?

19          **A. I have seen clamps that have leaked because**  
20          **they have been cut. I have seen clamps that have**  
21          **failed due to improper installation, meaning they**  
22          **failed to achieve a seal rather than breaking.**

23          Q. Any others?

24          **A. That's all that I can think of.**

25          Q. Okay. And you mentioned that the



1 dezincification mechanism is widely discussed in the  
2 literature yesterday I think. Is that fair?

3 **A. It is.**

4 Q. Is the stress corrosion cracking of  
5 stainless steel clamps addressed in the published  
6 literature?

7 **A. Stainless steel cracking due to chlorides is**  
8 **well-documented in published literature. The stress**  
9 **corrosion cracking mechanism occurring in austenitic**  
10 **stainless steel is well-documented in published**  
11 **literature. There is also some published literature**  
12 **addressing failures in stainless steel clamps specific**  
13 **to PEX plumbing systems in relation to adjacent**  
14 **dezincification corrosion in brass plumbing fittings.**

15 **But there's certainly a lesser body of**  
16 **publication that would be specific to PEX clamps than**  
17 **to stainless steel materials as a whole.**

18 Q. Are you aware of any papers that advocate  
19 that these austenitic stainless steel clamps should  
20 never be sold for PEX systems?

21 **A. I don't know that I have read those exact**  
22 **words in anything.**

23 Q. Have you read anything to that effect?

24 **A. Quite possibly. Not that I call**  
25 **specifically.**

1 Q. Okay.

2 A. But I believe that's a possibility.

3 Q. I mean, if you'd found a technical article  
4 saying that these clamps should never be sold into a  
5 system, I mean, you probably would have made a note of  
6 that. Right?

7 MR. SHAMBERG: Objection to form.

8 A. Depends on what context I had that article.

9 Q. Okay. But sitting here right now, you can't  
10 point me to any published literature advocating for  
11 the essentially discontinued sale of stainless steel  
12 clamps for PEX tubing?

13 A. I don't know of any document that  
14 specifically says that we should discontinue the sale  
15 of stainless steel clamps for PEX tubing that's in the  
16 public domain. That doesn't mean they don't exist.  
17 I'm not aware of one if it does that states exactly  
18 that.

19 Q. Okay. I have a question -- I have lots of  
20 questions, but let me ask you this: You told me  
21 yesterday that you advised Uponor to stop selling  
22 yellow brass?

23 A. I believe I would have said something to the  
24 effect of if we're going to sell brass fittings, we  
25 need to be making them out lower-zinc alloys that have

1           **less than 15 percent zinc.**

2           Q. And I'm asking you today, did you ever tell  
3           Uponor that they needed to stop selling stainless  
4           steel clamps for use in its PEX systems and you're  
5           refusing to answer?

6           A. I'm refusing to answer because we talked  
7           about the confidentiality after I probably said more  
8           than I should related to my communications with brass.  
9           However, please understand, it's not my role or was  
10          not my role at Uponor to tell Uponor what they can and  
11          can't sell. My role as a technical person would be to  
12          advise them regarding expected performance of  
13          materials.

14          Q. Okay. Regardless of what you told the  
15          people at Uponor, the industry standards still permits  
16          that use of yellow brass with a high zinc content.  
17          Fair?

18          A. The industry standard gives that as a  
19          choice, yes.

20          Q. Okay. And the industry standard permits the  
21          use of the austenitic stainless steel for the use in  
22          these clamps, the stainless steel clamps. Right?

23          A. It offers that among a variety of choices  
24          like copper crimp rings. Yes.

25          Q. And NIBCO's fittings and clamps, as far as

1           you're concerned, whether manufactured to the specific  
2           characteristics required by the standard, are  
3           defective either way, if the alloys are completely on  
4           point or not they're defective, if they use a zinc  
5           content that's higher than 15 percent or made of the  
6           stainless steel?

7                       MR. SHAMBERG: Object to form, compound,  
8           foundation.

9                       A. I believe that those materials are  
10          inherently defective in their design and their alloy  
11          selection because they are likely to fail prematurely  
12          in a potable water application by dezincification  
13          corrosion for the brass and by stress corrosion  
14          cracking for the brass and stainless steel clamps in  
15          the presence of chlorides for the clamps and in the  
16          presence of other compounds for the brass that would  
17          be commonly found in plumbing systems. So yes, I  
18          believe them to both be inherently defective in their  
19          design for the intended application.

20                      Q. Okay. I'll ask a simple question and I  
21          think this will get a simple answer, maybe not.

22                      MR. KUHLMAN: Put a little break in there in  
23          the transcript.

24                      Q. NIBCO's tubings -- not -- I tried to keep a  
25          clean question, but I couldn't do it. NIBCO's

1 fittings, even if manufactured to the specification,  
2 in your opinion are defective because they contain  
3 zinc in excess of 15 percent?

4 **A. Coupled with the design of the product, yes.**  
5 **You have residual stress associated with the design of**  
6 **the product that allows stress corrosion cracks to**  
7 **occur. You have to have stress and you have to have a**  
8 **susceptible alloy for stress corrosion cracking. For**  
9 **dezincification, it's about alloy chemistry alone.**

10 Q. Did you experience any fittings that had  
11 experienced stress corrosion cracking in any of the  
12 plaintiffs' homes here?

13 **A. Yes.**

14 Q. Which ones?

15 **A. The Medders residence certainly did the**  
16 **Monica residence may have at well.**

17 Q. How many of the fittings did you observe  
18 that had experience -- how many fittings total did you  
19 observe, in all your investigation here, that had  
20 experienced a stress corrosion crack?

21 **A. We didn't necessarily look to identify**  
22 **stress corrosion cracks in all of the brass fittings**  
23 **that were available. We noticed stress corrosion**  
24 **cracks and stress corrosion fractures in at least two**  
25 **different fittings from the Medders residence. So the**

1 mechanism clearly is at work.

2 We did not make any attempt to determine if  
3 stress corrosion cracking existed in every fitting  
4 that we handled or in most of the fittings for that  
5 matter. All brass fittings containing more than 15  
6 percent zinc will be inherently susceptible to stress  
7 corrosion cracking if tensile stresses are sufficient  
8 for the mechanism to occur and they clearly are.

9 Q. So every manufacturer who makes a fitting  
10 out of yellow brass that's over 15 percent is selling  
11 what you believe to be a defective component into the  
12 market?

13 A. If it is an F1807 brass insert fitting for  
14 PEX plumbing systems, yes.

15 Q. And the same question with respect to  
16 stainless steel, every -- the stainless steel PEX  
17 clamps. Every manufacturer who is making a  
18 standard-compliant stainless steel PEX clamp is making  
19 a product that you believe to be defective?

20 A. If they are made in accordance with that  
21 clamp design which would result in tensile stresses  
22 approaching or exceeding the yield strength for the  
23 material, yes, I believe that to be the case.

24 Q. So do you think the standard guides just got  
25 this wrong?

1                   **A. I do.**

2                   Q. Have you written -- like you're on some of  
3 these committees for the tubing. Have you reached out  
4 to anyone and said, hey, this is a real big problem --

5                   **A. Not yet.**

6                   Q. -- this is a ticking time bomb of some sort?

7                   MR. SHAMBERG: Objection. Asked and  
8 answered.

9                   Q. Not yet is the answer?

10                  **A. Not yet was my answer.**

11                  Q. And you won't tell me if you raised this as  
12 a potential issue at Uponor. Right?

13                  **A. I believe that it would be inappropriate for**  
14 **me to answer questions about Uponor beyond what's**  
15 **already been asked and answered.**

16                  Q. Okay. How about this: When you left Uponor  
17 and you were hired as an consultant, when you were at  
18 Metallurgical Technologies, did you advise any clients  
19 during the course of your work at that company that  
20 they needed to stop using either high zinc yellow  
21 brass for fittings or stainless steel for clamps to be  
22 used in PEX tubing systems?

23                  **A. I don't recall working for any PEX**  
24 **manufacturer other than Uponor during my time at MTI.**

25                  Q. Okay. Did you work on any matters for

1           Uponor, when you were at MTI, that involved stainless  
2           steel PEX clamps?

3                   **A. I don't recall. It's possible that I did.**  
4           **If I did, it would have been work that would have come**  
5           **through their attorneys.**

6                   Q. And during the course of that work, did you  
7           offer any testimony that you believed that the design  
8           of the stainless steel clamps was appropriate for use  
9           in PEX plumbing systems?

10                   **A. I don't recall what work that I may have**  
11           **done related to stainless steel clamps, if any --**

12                   Q. Have you ever offered --

13                   **A. -- if any, when I was at MTI.**

14                   Q. Have you ever offered any testimony, whether  
15           it be through an affidavit or in a deposition or a  
16           trial or a hearing, where you indicated that stainless  
17           steel was an appropriate selection choice for a PEX  
18           tubing clamp?

19                   **A. I believe that I have.**

20                   Q. When was that?

21                   **A. I don't recall. And I don't know in what**  
22           **capacity, if that would have been as a fact witness or**  
23           **as an expert, and I don't recall for sure if it was**  
24           **even under a deposition testimony.**

25                   Q. Okay. How would I find that?



1           **A. I don't believe there would be a way for you**  
2           **to find that. I don't know. I don't know, I don't**  
3           **recall there being a court reporter, I don't recall**  
4           **there being a transcript, which is leading me to think**  
5           **it was probably not in a deposition.**

6           Q. So there might be another affidavit floating  
7           around like what we saw yesterday?

8           **A. Not that I'm aware of.**

9           Q. Okay. Do you think that was when you were  
10          with Uponor or after that time period?

11          **A. After. But possibly during as well.**

12          Q. Okay. So there might have been multiple  
13          occasions where you opined that stainless steel was an  
14          appropriate material choice for PEX clamps?

15          **A. Not appropriate. Inappropriate. Did I**  
16          **misunderstand your earlier question?**

17          Q. I don't remember.

18          **A. I believed you said inappropriate. My**  
19          **response assumed you said inappropriate, to be clear.**

20          Q. Okay. All right.

21                 MR. KUHLMAN: Let's go off the record for  
22          five minutes so I can clean this up and see if we  
23          can't call it a day here pretty quick.

24                 (A recess was taken.)

25          Q. We're back on the record after a short

1 break. Ms. Smith, I'd like to direct your attention  
2 to your Cole report, which has been marked Exhibit 15,  
3 and if you would please turn to page 37.

4 **A. Okay.**

5 Q. All right. And what I'd like to know is  
6 with respect to this crimp that's performed here as  
7 depicted in Exhibit B, would you consider this to be  
8 appropriate installation if you saw that in the field?

9 **A. I'm looking at three different crimps in**  
10 **picture B. Which crimp are you referring to first of**  
11 **all?**

12 Q. Let's do all of them. Let's start at the  
13 top left.

14 MR. SHAMBERG: I'll object to form in terms  
15 of "appropriate."

16 Go ahead.

17 **A. Looking at a two-dimensional picture, I**  
18 **can't ascertain this adequately, based on this picture**  
19 **alone, if there is an installation error in all of**  
20 **these.**

21 Q. Well, on the bright side, you don't need to  
22 analyze this alone because presumably you took this  
23 picture, did you not?

24 **A. I did take this picture. But I don't recall**  
25 **in my head what each individual outlet of each**

1 individual fitting from all these different homes did  
2 or did not reveal. My memory is not that good. I  
3 wish it were.

4 Q. Why take the picture then?

5 A. Well, the picture shows that the fitting  
6 completely separated into two pieces, that was the  
7 reason for taking the picture, and to document the  
8 overall condition of the component. You see the  
9 deposit on the outside surface. It's to document the  
10 overall condition of the components, not to allow  
11 someone later to determine from the two-dimensional  
12 image if there were any type of installation error  
13 there.

14 Q. Well, so are you telling me that in order to  
15 assess if the installation is proper, you can't just  
16 look at pictures, you have to look at it in person?

17 A. I'm saying if you're asking me to look at  
18 this two-dimensional image and tell your from this  
19 image if there was any kind of installation error that  
20 existed at all in this assembly, I can't answer that  
21 off of a two-dimensional picture. That was not the  
22 charter that I was asked to do in this case, to work  
23 with pictures to determine if there was an  
24 installation error.

25 Q. Is it safe to say then that you weren't

1 checking to see if crimps were properly made pursuant  
2 to the standard when you were inspecting these homes?

3 A. That is not what I said first of all. We  
4 did check some crimps on a select basis to determine  
5 if they were -- if they were installed properly or  
6 improperly. We didn't necessarily check every one of  
7 them. And we also checked to see if there was any  
8 type of installation issue that would be a reasonable  
9 root cause of failure for the NIBCO products at issue  
10 in this case. If you have a specific question about  
11 these, I would be happy to try to answer it.

12 Q. All right. Look over at picture A then.

13 A. Okay.

14 Q. There's a ruler in this picture. Why is  
15 there a ruler in the picture?

16 A. There is no ruler in the picture. That is a  
17 tape measure.

18 Q. Okay. There's a tape measure in the  
19 picture. Why did you include a tape measure in the  
20 picture?

21 A. Because it's standard practice, when you  
22 take a macro that lends itself to it, to include some  
23 type of scale for reference when you can.

24 Q. Great. And utilizing the scale provided by  
25 that tape measure, are you able to assess if that

1 crimp that's depicted on the top right is properly  
2 placed on that fitting?

3 A. When you say that crimp depicted on the top  
4 right, I don't know what you mean. Could you please  
5 point me to what crimp you're referring to?

6 Q. Well, if you look, there's three crimps  
7 depicted. Right?

8 A. Which figure are you referring to --

9 Q. We're still --

10 A. -- A, B, C or D?

11 Q. We're still referring to A.

12 A. Okay.

13 Q. And you see the three crimps depicted in  
14 that picture. Right?

15 A. I see three copper crimp rings in that  
16 picture, yes.

17 Q. And two of them are higher than the other  
18 one?

19 A. When you say higher, I don't know what you  
20 mean.

21 Q. Higher on the page.

22 A. Higher on the page. Okay.

23 Q. Okay. Let's do the one that's highest on  
24 the page to the right --

25 A. Okay.

1 Q. -- of those three.

2 A. Okay.

3 Q. Using that ruler as your guide, are you able  
4 to determine if that crimp is properly placed on that  
5 fitting?

6 A. I would not attempt to determine that from a  
7 picture, no, using that ruler. What I can say is if  
8 there is a placement issue, I'm not confident I can  
9 accurately see the shoulder of the fitting in this  
10 picture adjacent to that crimp ring. There are white  
11 deposits there. There's PEX pipe that looks like it  
12 may even been overriding the shoulder slightly.

13 So I'm not confident that from this picture  
14 I can determine the placement of that clamp. What I  
15 do see is that it fractured on the opposite outlet  
16 away from that copper crimp ring and that's where my  
17 attention would be focused if I'm trying to determine  
18 whether or not a crimp contributed to the fracture  
19 that we're showing with this fitting. I would not  
20 look at a different outlet that didn't fracture to  
21 draw conclusions about a fractured outlet.

22 Q. Did you alter the condition of the -- I'm  
23 going to call it the top left crimp. Did you alter  
24 the condition of that tubing as it sits within that  
25 crimp ring before you took this picture?

1                   **A. Not to my knowledge.**

2                   MR. SHAMBERG: Object to form.

3                   Q. Did you view this crimp at any point when  
4 the fitting was still completely intact?

5                   **A. The fitting was not completely intact. The**  
6 **way it was submitted to me, it was broken in two**  
7 **pieces as it came to me.**

8                   Q. The answer to the question is no, you did  
9 not do that?

10                  **A. I did not --**

11                  Q. You did not have an opportunity --

12                  **A. I did not break the fitting and I did not**  
13 **see the fitting in service prior to it breaking in**  
14 **two.**

15                  Q. Okay. What did the standard call for in  
16 regard to crimp fitting on a placement?

17                  MR. SHAMBERG: Objection.

18                  **A. Which standard are you referring to? Sorry.**

19                  Q. Is there a standard that addresses the crimp  
20 placement on a fitting on a brass fitting?

21                  **A. There may be many standards that reference**  
22 **something to that effect. Which standard are you**  
23 **referring to specifically?**

24                  Q. An ASTM standard.

25                  **A. There may be more than one ASTM standard**

1           **that would address them.**

2           Q. All right. Let's do this: Where does the  
3 NIBCO installation manual state that a crimp should be  
4 placed on a fitting?

5           **A. I don't know. I don't have a copy of the**  
6 **NIBCO installation manual.**

7           Q. Would you be surprised to learn that it's  
8 between an eighth and a quarter of an inch?

9           **A. Nothing would surprise me.**

10          Q. All right. Do you have an understanding of  
11 how to properly put a crimp ring on a fitting when you  
12 seal it?

13          **A. I do.**

14          Q. All right. What's your understanding of  
15 that?

16          **A. My understanding, when I try to assemble**  
17 **one, is I try to seat that crimp so that it's**  
18 **approximately centered over the sealing barbs in the**  
19 **fitting.**

20          Q. Okay.

21          **A. And --**

22          Q. Where does that normally land itself with  
23 respect to the fitting?

24          **A. It would normally land in approximately the**  
25 **range that you cited.**



1           Q. Quarter or -- an eighth of an inch to a  
2 quarter of an inch?

3           **A. That would be probably a pretty good**  
4 **approximation.**

5           Q. Okay.

6           **A. If you want to know what the standard says,**  
7 **we'd have to look at the standard.**

8           Q. So if you install the crimp ring in that  
9 location, does that allow for some amount of PEX  
10 tubing to be visible on the other side of the crimp if  
11 you will?

12          **A. Usually there should be.**

13          Q. All right. So if we look at the picture in  
14 the top left on A, right where this fitting is  
15 broken --

16          **A. Uh-huh.**

17          Q. -- was that fitting tight on that tubing  
18 sample when you received it?

19          **A. I don't recall.**

20          Q. Did it slide around when you picked it up?

21          **A. I just said I don't recall. I don't recall**  
22 **anything sliding around.**

23          Q. Okay. Well, I mean, did you modify the  
24 appearance of that crimp before you took the picture?

25          **A. You've already asked me that and I already**

1           **answered, not to my knowledge.**

2           Q.   Okay.   So this accurately reflects, to the  
3           best of your knowledge, what that crimp would have  
4           looked like in the field, but it would have been stuck  
5           together.   Right?

6           A.   It probably does unless someone else who  
7           handled these moved it.   A plumber handled these  
8           before me.   I believe that some representatives from  
9           ESI handled these before me.   I have no reason to  
10          believe that someone did or didn't move them, but I  
11          did not move them.

12          Q.   And you would agree with me that there is no  
13          PEX showing, on the other side, an eighth of an inch,  
14          a quarter of an inch of PEX, showing on the other side  
15          of that crimp.   Right?

16          A.   From that top left crimp in view A and in  
17          that orientation, I would agree that's correct.

18          Q.   Shouldn't there be some if it was properly  
19          crimped?

20          A.   For what purpose?

21          Q.   For sealing the joint.

22          A.   Depends upon where the tubing was relative  
23          to the end of the outlet.   I would not look at the  
24          amount of PEX that's present to determine whether or  
25          not a proper seal was achieved.   That's not a very

1           reliable way to make that determination. I would look  
2           at the witness marks inside the pipe to determine  
3           whether or not a proper seal was achieved.

4           Q. Okay. Were you able to do that with respect  
5           to that fitting?

6           A. I don't recall specifically to that fitting.  
7           My guess would be no since a portion of the outlet is  
8           still intact inside that fitting. And my purpose in  
9           looking at that fitting was to determine the fracture  
10          mechanism to determine why the thing snapped in two.

11          Q. Okay. So taking this universe of photos,  
12          the ones contained in A, you know, the picture in A,  
13          B, C and D, taking all these images into  
14          consideration, would you opine that this -- that these  
15          crimps were properly made on that fitting?

16          MR. SHAMBERG: Object to form.

17          A. Not all of them were made in accordance with  
18          the standard with regard to placement for the clamps  
19          from what we can see in this picture. If that is your  
20          question, I would say not all of them appear to have  
21          been properly positioned. The real question here, if  
22          we're trying to determine root failure for the  
23          product, however, is why did it fracture, what's the  
24          fracture mechanism, what is the underlying root cause  
25          or causes and would that have affected that failure

1 mechanism or have been a potential root cause.

2 That we did consider and have considered  
3 through the evaluation of many different PEX products  
4 that are made from these same materials and same  
5 construction. And we know through the cumulative  
6 effort of all of those investigations that in fact  
7 simply placing the crimp ring slightly off from where  
8 it should be is not going to cause dezincification  
9 corrosion and it did not cause these systems to fail  
10 due to stress corrosion cracking. So whether there is  
11 an installation-related defect present or not, that is  
12 not what caused these fittings to break.

13 Q. Did it contribute to the failure?

14 A. I have no reason to believe that it  
15 contributed to the failure in any significant way at  
16 all.

17 Q. What steps did you take in reaching that  
18 conclusion?

19 A. Thorough examination and evaluation of the  
20 plumbing components, the evaluation of the fracture  
21 surfaces themselves, the evaluation of the alloy  
22 chemistry, evaluation of this and other brass fittings  
23 that also exhibited stress corrosion cracks in places  
24 where there was no clamp where there would have been  
25 no position-related issues or stresses and cracks

1 occurring in multiple different orientations that were  
2 not in keeping with stresses that would be applied by  
3 a crimped copper crimp ring.

4 Q. On this sample?

5 A. On many different samples.

6 Q. This one, what did you do specific to this  
7 one?

8 A. Everything I cited --

9 Q. To determine --

10 A. -- and then some.

11 Q. All right. Did you view this actual fitting  
12 or -- did you view where this fitting was actually  
13 located in the Medders home?

14 A. No.

15 Q. Okay. Do you know if there was a sharp bend  
16 off of this -- the -- what I'll call the lower part of  
17 the T, so not the crossbar at the top, but the one  
18 that goes down?

19 A. We have no reason to believe that there was  
20 an appreciable bend on the fractured outlet. It looks  
21 like there may have been some degree of bend on  
22 another outlet from this assembly. What we can tell  
23 from looking at the fracture surface is that it is not  
24 a bending load that caused that fracture to occur. We  
25 know that because it was initiating at multiple

1           locations around the entire interior surface of that  
2           fitting and if it had instead resulted from a bending  
3           stress, it would have initiated at a different  
4           location and propagated in a different manner.  
5           Therefore, we can reasonably rule out contribution  
6           from bending in adjacent pipe.

7           Q. Let's take a look at your Meadow report for  
8           just a minute, it's Exhibit 2.

9           A. Okay.

10          Q. Please flip to page five, figure three.

11          A. Okay.

12          Q. All right. So if you look here at figure  
13          three, this shows an incident leak site from the  
14          McLaughlin house. Right?

15          A. Yes.

16          Q. And this is the interior surface of the  
17          pipe. Is that fair?

18          A. Correct.

19          Q. And what I want to ask you about are on the  
20          left and right side of the crack, you see what I'll  
21          describe as whiteness that is at the edges of the  
22          cracks like on the interior part of the crack. And I  
23          want to ask you, are those the types of ductile  
24          fibrils that you described in other places?

25          A. I need you to point to exactly what you're

1           referring to so that I can be sure I'm interpreting  
2           this correctly.

3           Q. Let me do that, that'll be easier.

4           A. Do you want to circle this and --

5           Q. No. I'll just point to it.

6           A. Okay.

7           Q. So on -- I'm talking about. Do you want me  
8           to circle it? No, I don't need to do that. This  
9           right here and this right here.

10          A. Okay.

11          Q. Okay. So is that evidence of ductility in  
12          the PEX tubing at the edges of this crack?

13          A. From this specific picture, I can't tell  
14          exactly what that is at this magnification. It looks  
15          like there is a potential that there could be some  
16          ductility beginning to show up. As these cracks begin  
17          to grow by the crack growth mechanism they initiate in  
18          a very brittle manner in the surface due to oxidative  
19          degradation. And as they grow, they grow in kind of a  
20          clamshell-shaped pattern.

21                 Sometimes that growth occurs in a  
22          longitudinal direction at the crack tips kind of  
23          beneath the oxidized surface later and then it will  
24          break through to that surface layer. So I can't be  
25          certain if we're just seeing pieces of that crumbled

1 surface later, as sometimes happens, or if that would  
2 be actual ductility where the crack began to dive  
3 subsurface. It appears to me as though it is more  
4 likely related to the oxidized material. I don't see  
5 what I would call comfortably ductile fibrils in this  
6 picture.

7 Q. Is there craze cracking exhibited in this  
8 picture?

9 A. Yes.

10 Q. And would you describe that as longitudinal  
11 craze cracking or running parallel to the crack  
12 itself?

13 A. I see longitude -- well, those are saying  
14 the same thing.

15 Q. Right.

16 A. This crack is oriented longitudinally. I  
17 see crazes going in both transverse and longitudinal  
18 in this picture.

19 Q. Okay. All right. If you could flip back --  
20 let's go back to Exhibit 15. This is your Cole  
21 report. If you could please flip back to page 99.  
22 And this is from a section of your report titled  
23 published literature considered.

24 A. Okay.

25 Q. Which of these pieces of literature did you



1           rely on in formulating your methodology for analyzing  
2           NIBCO's PEX tubing?

3                   A.   I don't --

4                   MR. SHAMBERG:   Object to form.

5                   A.   I don't necessarily believe I relied upon  
6           any one of these to develop a methodology for  
7           evaluating the tubing.   I don't understand exactly  
8           what you mean perhaps by that, but I have relied upon  
9           my 16 years of experience in performing failure  
10          analysis in PEX plumbing components to establish my  
11          methodology for evaluating them.

12                  Q.   Are you aware of any other experts in your  
13          field who rely on the analysis of failed-in-service  
14          tubing samples to assess the stability of tubing  
15          that's sold in the market for PEX?

16                  A.   I am aware of many, many experts who have  
17          evaluated field-return product to assess the  
18          distribution of residual stabilization in the wall of  
19          the pipe and who assess the presence or absence of  
20          oxidation in the pipe wall in the same manner that I  
21          have.   I did not rely upon testing alone to assess the  
22          condition of as-manufactured pipe or even necessarily  
23          at all.

24                  What I have relied upon to assess the  
25          as-manufactured condition, beyond the work that I did

1           with never-installed pipe in the Christianson case,  
2           was to rely upon testing performed by others on new  
3           NIBCO pipe that had never been in service.

4           Q.   So you relied on the samples you did -- the  
5           tests you did on two different reels of unused 1006  
6           pipe?

7           A.   In part.

8           Q.   In part. And then you also relied on --  
9           would those be Jana reports that you're referencing  
10          that tested unused NIBCO tubing?

11          A.   In part.

12          Q.   Were there other test reports testing unused  
13          NIBCO tubing that you relied on that were not prepared  
14          by Jana?

15          A.   Yes.

16          Q.   And who prepared those reports?

17          A.   I don't recall necessarily all of them as we  
18          sit here today, but certainly there was a report  
19          prepared by Total addressing stability in the pipe and  
20          the presence or absence or distribution of  
21          antioxidants in the pipe wall. There were lots of  
22          internal communications within NIBCO and between NIBCO  
23          and Jana and other organizations.

24          Q.   I'm talking specifically about reports that  
25          discussed test results.

1           A. I don't recall the full body necessarily of  
2           test reports that I have reviewed that might be  
3           related to that as we sit here.

4           Q. Okay. So you have reviewed test reports  
5           prepared by Jana addressing NIBCO's 1006 PEX pipes.  
6           Right?

7           A. Correct.

8           Q. And through your review of those test  
9           reports, at any time, in any of those reports, did  
10          Jana make a recommendation to NIBCO that it stop  
11          manufacturing its 1006 PEX pipe?

12          A. I don't recall them necessarily using those  
13          exact words, but they certainly expressed concern that  
14          that pipe was not going to perform well in the field.  
15          They reiterated that concern when they evaluated  
16          field-return product that had failed and correlated it  
17          back to saying this is basically consistent with what  
18          concerns we expressed before regarding nonuniformity  
19          and insufficient stabilization in the pipe. And they  
20          clearly worked very closely with NIBCO to try to  
21          develop a more robust product and they clearly had  
22          concerns that NIBCO would lose their listing with NSF  
23          due to those instability issues.

24          Q. All right. Let me make this simple. At any  
25          time, did Jana tell NIBCO that it should stop

1 manufacturing its 1006 PEX pipe?

2 **A. I can't answer that question. I have no**  
3 **idea whether they, at any time, told NIBCO that.**

4 Q. In any of the reports or documents that  
5 you've reviewed in this case, did Jana advise NIBCO  
6 that it needed to stop manufacturing its 1006 PEX  
7 pipe?

8 **A. I'm not aware of them using those words in**  
9 **any report.**

10 Q. Do you consider Jana to employ experts in  
11 the field of plastic tubing?

12 **A. That's a very broad question that would**  
13 **encompass a lot of different things. Jana certainly**  
14 **employs people who have experience in certain areas of**  
15 **expertise as it relates to PEX tubing. They may or**  
16 **may not be experts in all areas related to PEX tubing.**

17 Q. All right.

18 MR. KUHLMAN: Let me take two or three  
19 minutes to consult with Franco a minute. I think  
20 we're going to be done. Oh, let's stay on the record  
21 I remembered what I was forgetting.

22 Q. All right. If you could, in your Cole  
23 report, Exhibit 15, please flip back to page 85 and  
24 86.

25 **A. Which would you like me to flip to first, 85**

1           **or 86?**

2           Q. I want to talk to you about your opinion  
3           number 14 and number 14 refers to an image that's on  
4           86, which is described in figure 24.

5           **A. Okay.**

6           Q. Take a look at that --

7           **A. Yes. Please.**

8           Q. -- and let me know when you're ready.

9           **A. Okay.**

10          Q. Okay. My question is: Based on the  
11          documents you've reviewed, are you able to tell if the  
12          tubing that was referenced in figure 24 as being  
13          marked with the date -- well, the date of 2-28-13, are  
14          you able to tell from the documents you reviewed, if  
15          that tubing was manufactured and e-beamed before or  
16          after NIBCO's NSF certification had expired?

17          **A. I'm not sure I understand your question.**

18          Q. Okay. During the manufacturing of NIBCO's  
19          PEX tubing, you understand that the tubing is  
20          extruded. Right?

21          **A. Correct.**

22          Q. And then after it's extruded it's e-beamed.  
23          Right?

24          **A. Okay.**

25          Q. And then once it's e-beamed, you have PEX.

1 Right?

2 A. You have PEX in some condition, yeah.

3 Q. Okay.

4 A. It hasn't been labeled yet.

5 Q. It's crosslinked at that point?

6 A. Okay.

7 Q. Correct?

8 A. It should be.

9 Q. Okay. So what does the standard require  
10 with respect to when a manufacturer puts a date code  
11 on the tubing?

12 A. It requires that the pipe be labeled to  
13 indicate the date of manufacture. NIBCO's internal  
14 specification SOPQC-1015 states that the PEX pipe --  
15 it says it's to brand PEX with the date that it is  
16 cut, coiled and marked. It says, this presents a  
17 challenge due to the termination of our NSF listing  
18 for PEX manufactured with Total HDPE. Any remaining  
19 Total work in process, which they abbreviate WIP,  
20 manufactured prior to the termination of this listing  
21 but still requiring application of the NF print  
22 stream, will need to be branded in a manner that  
23 indicates it was manufactured while the NSF listing  
24 was still active.

25 It says, at the bottom of all of this, this

1 change will enable us to most closely approximate the  
2 date upon which this material is released to trade.  
3 This change applies to Total work in process only.

4 ASTM F876 with regard to labeling states,  
5 the manufacturer's name or trademark -- this is  
6 section 10.2.2 of ASTM F876-09. It states, the  
7 manufacturer's name or trademark and production code  
8 indicating the date of production is to be included in  
9 the marking on that pipe. NIBCO defines their date of  
10 production as the date that the pipe is cut coiled and  
11 marked. So they labeled this pipe differently from  
12 how they labeled all other pipes.

13 And if someone, years from now, has an issue  
14 with that pipe and they need to go back to the  
15 manufacturer, they would be misled to believe that  
16 that pipe actually went out the door or was cut,  
17 coiled and marked at least on a different date than  
18 when that actually occurred.

19 Q. Okay. So you're not taking issue -- you're  
20 not saying that NIBCO manufactured this tubing after  
21 its NSF certification had expired?

22 A. To some degree, they did. Their  
23 manufacturing process was not complete. The cutting,  
24 coiling and marking of that tubing is part of their  
25 manufacturing process and their internal procedure

1           says our process ends on the date that we cut it, coil  
2           it and mark it, that's the date that we have defined  
3           as our manufacturing date or process date.

4           Q. Well, do you know if this needed to be cut,  
5           coiled and marked at this point?

6           A. Yes. It had to be marked.

7           Q. Okay.

8           A. And they state that that presents a  
9           challenge because we can't sell it if it doesn't have  
10          the NSF mark on it and if we put the real date that we  
11          finish our manufacturing process by cutting it,  
12          coiling it and marking it, then we can't sell it  
13          because we're no longer compliant with the NSF  
14          regulations because we really didn't have  
15          certification on that date.

16          But we want to sell it anyway, rather than  
17          scrap it, we want to sell it anyway so we're going to  
18          pretend that we did that cutting, labeling and coiling  
19          on a different date than when we actually did it and  
20          we're just going to go ahead and print that on the  
21          pipes so people will think it was done when we still  
22          had our ASTM certification.

23          Q. And the NSF certification that you read  
24          doesn't define when a tubing is completely finished  
25          with the manufacturing process. Right?



1           A. It simply states, the manufacturer's name or  
2 trademark and production code indicating the date of  
3 production. NIBCO defined their date of production as  
4 the date that the pipe is cut, coiled and marked, in  
5 SOPQC-1015.

6           Q. And NIBCO changing the date of production as  
7 NIBCO defines it doesn't necessarily violate the terms  
8 of the standard. Right?

9           A. Whether it violates the terms of the  
10 standard or not is not the issue here. It feels  
11 rather irresponsible, is the word I guess that comes  
12 to mind to me, for a manufacturer to deliberately  
13 misrepresent the manufacture date in an effort to  
14 continue selling this pipe rather than scrapping what  
15 they know had not completed the manufacturing process  
16 before they lost their NSF listing.

17           They're holding that pipe out to consumers  
18 as having been certified and completed as of that  
19 date, which is false.

20           Q. Well --

21           A. It speaks to the integrity of the company.

22           Q. Okay. Well, if NIBCO didn't define its  
23 manufacturing date as the date it was cut, coiled and  
24 marked and instead defined it as the date that it be  
25 becomes PEX, right, then this would be a different

1 scenario? Right?

2 A. There are many things that would be a  
3 different scenario had NIBCO made different choices.

4 Q. I see.

5 A. We have to deal with what they actually did  
6 decide.

7 Q. Right.

8 A. They did make a decision of how they would  
9 define their production date and they decided to  
10 deviate from that for these pipes only to misrepresent  
11 them as having been manufactured during a time when  
12 the NSF certification was in place, when in fact that  
13 was not -- that was not the case.

14 Q. If you could please turn back to table 6 on  
15 page 72.

16 A. Okay.

17 Q. All right. To take your gel content -- to  
18 obtain your gel content readings, did you utilize the  
19 solvent xylene or decalin?

20 A. Both.

21 Q. Okay. Which ones of these relied on decalin  
22 for the solvent?

23 A. The bottom six.

24 Q. And why did you pick those six to utilize  
25 that solvent?

1           A. I picked samples that I had already  
2 previously analyzed in xylene so we could have a  
3 direct comparison. I picked samples that represented  
4 homeowners from each case and I picked samples that  
5 were of different colors, so I somewhat randomly,  
6 within that framework, picked several samples.

7           Q. Well, in your prior experience, did you  
8 observe that when the tests were done with decalin,  
9 the gel percentage numbers were higher?

10          A. They generally are a little higher. They're  
11 generally about two percentage points higher.

12          Q. And the standard, if you're going to  
13 strictly comply with the standard, requires the use of  
14 decalin, does it not?

15          A. If you're going to strictly comply with the  
16 standard, yes. However, NIBCO did not comply with the  
17 standard in the method they used to monitor the degree  
18 of crosslinking in their as-manufactured pipe.  
19 They --

20          Q. Well --

21          A. Excuse me. May I finish, please?

22          Q. Sure.

23          A. They, like many other PEX manufacturers,  
24 chose instead to rely on xylene. In my experience,  
25 that's pretty much the norm in the PEX industry. And

1           in fact, the replacement standard that has been issued  
2           with regard to gel content testing now identifies  
3           xylene as the preferred solvent. For completeness, I  
4           used both for comparison purposes.

5           Q. Okay. And when you selected samples, you  
6           selected samples that had higher gel content. Right?

7           A. That's incorrect. I selected all of those  
8           samples before my testing was completed.

9           Q. Okay.

10          A. They were sent to the other lab before my  
11          testing was completed and before I had gel content  
12          results.

13          Q. Had you complied strictly with the ASTM 876  
14          standard for gel content, you would have expected  
15          using decalin for these numbers to be one to two  
16          percent higher?

17          A. Generally, yes.

18          Q. All right. Which would have brought the  
19          McMahon sample PPX 81A into compliance. Right?

20          A. Possibly, but not necessarily. You're  
21          assuming that the variation we're seeing in results is  
22          attributed solely to the use of xylene. It may also  
23          be due to localized variations in the degree of  
24          crosslinking within that pipe.

25          We know, from work that Jana did on NIBCO

1 pipe, that crosslinking varied significantly both  
2 around the circumference of NIBCO pipe and within the  
3 walls of the pipe. So it would be a little misguided  
4 to assume that what we're seeing here is merely a  
5 reflection of decalin. It could be, but it is not  
6 necessarily.

7 Q. Regardless, when you say conform to ASTM  
8 876, that's based on the test that you performed that  
9 didn't comply with the strict requirements of that  
10 standard. Fair?

11 A. They were tests that I performed for the  
12 purpose of seeing what NIBCO would have seen if they  
13 tested the same pipe at the same location before  
14 sending it out into the stream of commerce. So if it  
15 had been performed with decalin in the exact same  
16 location, which it was not because it can't be, you  
17 have to use a different sample from the same pipe, we  
18 may or may not have gotten the same result.

19 I would not be surprised if it would vary by  
20 one to two percent based on my experience. It could  
21 likely be one to two percent higher if we tested it  
22 with decalin, but there's no guaranty that it would  
23 have had to have been.

24 Q. Now, you didn't say, in this chart or in  
25 your report, conform to ASTM F876 if NIBCO had done

1 the test. Right? You're saying conform to ASTM F876.  
2 And my question to you is simple. You're basing that  
3 statement with respect to the xylene-tested samples on  
4 testing that did not comply with the standard outlined  
5 for gel content testing?

6 A. And the conclusion I have drawn from this is  
7 not purely about the conformance first of all. Maybe  
8 my wording here in the title is misleading you  
9 regarding the purpose for doing this test in xylene.  
10 I'm simply comparing the number here. So maybe I have  
11 not worded that as clearly as I needed to in the title  
12 for the header.

13 NIBCO however did rely on that exact same  
14 version of the test, using xylene to determine if  
15 their product was in conformance with ASTM F876, for  
16 the purpose of determining if that pipe was suitable  
17 to be sold into the stream of commerce. So maybe what  
18 I should have said, to be more clear, is would NIBCO  
19 have determined that this conformed to ASTM F876.

20 That was the purpose of this assessment:  
21 Would NIBCO have made that determination based upon  
22 this result and what the standard says. So the yes or  
23 no that you see there should properly say would NIBCO  
24 have determined that this conformed to ASTM F876.

25 Q. And based on NIBCO's internal policies and

1 procedures, if it tested the tubing and the gel  
2 content came back at under 65 percent, they would have  
3 scrapped that lot. Right?

4 A. They should have.

5 Q. And it would have as far as you know?

6 A. Not necessarily. They certainly didn't  
7 scrap lots of pipe that had nonconforming dimensions  
8 and nonconforming degrees of out-of-roundness.

9 Q. Are you aware of any lot where a gel testing  
10 number came back at under 65 percent and it was not  
11 scrapped?

12 A. I have not seen evidence that would indicate  
13 that. I have also not seen evidence that would refute  
14 that. NIBCO only tested, what, three feet of their  
15 pipe per week or something -- actually less than that.  
16 They tested samples I believe weekly. Out of the  
17 millions of feet of pipe that you have represented  
18 that they manufactured and sold, clearly only a very,  
19 very small percentage of that was even being evaluated  
20 for conformance to gel testing.

21 What these results do show and have shown  
22 repeatedly in a variety of cases, no matter who has  
23 evaluated them and no matter what solvent was used,  
24 clearly pipe that was not sufficiently crosslinked has  
25 made it out of the plant, into the stream of commerce.

1 NIBCO did sell pipe that was under-crosslinked.

2 So whether the issue is that they weren't  
3 looking frequently enough or whether they looked and  
4 saw and let it go anyway, either way they were remiss  
5 in selling pipe that they represented as being  
6 compliant with ASTM F876 when in fact it was not.  
7 Whether they knew it wasn't or just should have known  
8 it wasn't is a matter of debate, but the facts are  
9 clear from a technical perspective, they did sell pipe  
10 that did not conform to ASTM F876. That's been shown  
11 repeatedly.

12 Q. You can't determine if a piece of pipe  
13 conforms to F876, from a technical standpoint, without  
14 performing testing on that sample. Right?

15 A. Correct.

16 Q. And the gel content numbers that you've  
17 created are based on pieces of tubing that are coming  
18 out of an in-service application. Right?

19 A. Which does not change the degree of  
20 crosslinking in the sample, but yes.

21 Q. Okay. Does the standard discuss testing gel  
22 content on pipes removed from service?

23 A. The pipe certainly doesn't prevent us from  
24 doing that, but it is designed where the manufacturing  
25 process is standard.



1 Q. Okay.

2 A. So it probably would not specifically say  
3 anything about field-return product. They like to  
4 assume you got it right in the beginning and that you  
5 won't have field-return product.

6 Q. You were talking about 22 percent of field  
7 service return pipes not meeting the gel content  
8 percentages. We talked about that.

9 A. That's an approximate number.

10 Q. And this first sample here, PPX 105, is  
11 listed at 65 percent. It's in red though.

12 A. Yes.

13 Q. Did you indicate -- did you include that in  
14 your 22-percent calculation?

15 A. I don't recall. As I said, that number is  
16 an approximate number that I threw out based upon my  
17 recollection of calculations. What you do need to  
18 know about that 65.0 number is that it is exactly at  
19 the bottom end of the range of 65.0 to 68.0 for what  
20 would be considered acceptable in accordance with the  
21 ASTM F876 standard.

22 The standard also goes on to state, relative  
23 to crosslinking -- if you have that specific standard,  
24 there is a different standard that we would need to  
25 look at for that. That standard goes on to state that

1 the PEX material cannot be under-crosslinked anywhere  
2 in that wall. When we do the ASTM F876 test for gel  
3 content, we are looking at a full-wall-thickness  
4 ribbon from that sample that is shaved over a length  
5 of the pipe.

6 So we're taking into account material at the  
7 interior surface at the midwall and at an OD surface  
8 and we are reporting an average value. The standard  
9 that governs the crosslinking requirements for the PEX  
10 pipe specifically states that the tubing may not be  
11 under-crosslinked -- I'm looking at section 7.9 from  
12 ASTM F876 under note 7. It states, this method  
13 provides a test method for measuring the average  
14 degree of crosslinking over the tubing wall thickness.

15 That however does not mean that the degree  
16 of crosslinking is allowed to vary outside the limits  
17 for the grade in question at any part of the tubing.  
18 In case of disagreement, strips of the same thickness  
19 .004 inches can be taken in tangential, axial or  
20 radial direction at any angle, section or wall  
21 thickness, depth, or both, to measure the degree of  
22 crosslinking.

23 This number is an average. It tells us that  
24 there is a very high likelihood that there were areas  
25 within that pipe wall that would have been a little

1       above 65.0 and there would be areas that would be a  
2       little below 65.0. Numerically, they have averaged  
3       out to a number that is exactly at the very bottom end  
4       of the range. So it's highlighted in red for that  
5       reason.

6               With relative certainty, that pipe had at  
7       least some areas that were under-crosslinked,  
8       particularly when we view that number in light of the  
9       data that has been reported by Jana Laboratories for  
10      NIBCO pipe showing that the degree of crosslinking  
11      varied significantly both within the wall and  
12      circumferentially around the pipe due to an inherent  
13      interaction of the beam.

14             Q. Did you do any testing on your own to  
15      determine if there were different gel contents at the  
16      outer wall, midwall or inner wall of these tubing  
17      samples?

18             A. We have not.

19             Q. Do you have any data whatsoever to support  
20      the conclusion that there is a quantifiable difference  
21      in the gel content of the outer wall, midwall or inner  
22      wall of the tubing in any of these plaintiffs' houses?

23             A. We can render that opinion based upon  
24      testing that was done by Jana on new pipe that's never  
25      been in service. I don't need to repeat that testing

1           **here to get to that conclusion.**

2           Q. I'm talking about with respect to these  
3           plaintiffs' houses. Do you have any data to suggest  
4           that these plaintiffs' pipes had differing levels of  
5           gel content at the outer, mid or inner wall?

6           **A. We have data generated by Jana Laboratories**  
7           **evaluating NIBCO's process, stating that the**  
8           **differences they observed were an inherent interaction**  
9           **with the beam that could not be changed. Therefore,**  
10          **we would have reasonable certainty to believe that all**  
11          **NIBCO pipes of the same formulation, exposed to the**  
12          **same beam process, would also experience similar**  
13          **levels of variability and similar patterns of**  
14          **variability in the pipe.**

15          Q. And under your theory with the variability  
16          in the pipe, there could be long runs of this pipe  
17          with higher levels of gel content and then long runs  
18          of this pipe with lower levels of gel content. Right?

19          **A. There could be.**

20          Q. And there could be long runs of this pipe  
21          that complied with every aspect of F2023 if you tested  
22          it and may be long runs where it didn't. Right?

23          **A. There could be. But all of them would still**  
24          **exhibit the same underlying deficient formulation and**  
25          **all of them would have still been subjected to the**

1 same process that results in this highly variable PEX  
2 tubing that has now repeatedly failed from coast to  
3 coast, due to oxidative degradation, in less than ten  
4 years.

5 Q. What exactly is variable inside the tubing?  
6 Is it the amount of antioxidant that's variable?

7 A. There are many things that were variable in  
8 this tubing.

9 Q. Okay. Which things that are variable --  
10 okay. We're going to circle back to that in second.  
11 Let's go back to this table six. You're familiar with  
12 the gel content standard I would assume. And when it  
13 says 65 percent, the standard actually allows for  
14 rounding up to the next closest number, does it not?

15 A. It allows for rounding to the decimal place  
16 I believe. Let me just verify that. Do you have the  
17 gel content standard here with you?

18 Q. I do not.

19 A. Okay. Then we would need to refer to the  
20 standard to make sure that my recollection is correct.

21 Q. Assuming that it does allow for rounding up,  
22 then samples like PPX 31 would fall into compliance  
23 with ASTM F876. Right?

24 A. Bear with me. ASTM F876 specifies -- let me  
25 make sure I'm getting this right. We need to see both

1 standards and compare them to be able to confidently  
2 and accurately answer that question. And you don't  
3 have the second standard here. Is that correct?

4 Q. No, not at this time. But I can get it.

5 A. Okay.

6 Q. Okay. Well, assuming that I'm correct and  
7 the standard allows for rounding up, that would bring  
8 PPX 31 into compliance, would it not?

9 A. If it allows for rounding to the nearest  
10 whole number, that would give PPX 31 a value of 65.0.  
11 Actually it would be 65 with no decimal because it's  
12 currently 64.7.

13 Q. And that would be compliant with ASTM F876.  
14 Right?

15 A. If it allows for rounding.

16 Q. Right. And as you would expect, if decalin  
17 was used on PPX 81, consistent with the requirement of  
18 the standard, you would expect that one to come up to  
19 65, too. Right?

20 MR. SHAMBERG: Objection. Mischaracterizes  
21 testimony.

22 A. I'm sorry. Which one?

23 Q. PPX 81A for McMahon.

24 A. And what was your question?

25 Q. If you used decalin, you would expect that

1           that particular gel content result to come back up  
2           into compliance, too, wouldn't you?

3                       MR. SHAMBERG: Same objection.

4                       **A. Not necessarily.**

5                       Q. Does the standard provide for retesting when  
6           a result is reached that is below 65?

7                       **A. Which standard are you referring to?**

8                       Q. Well, either F876 or the standard that deals  
9           with gel content and I don't remember the number of it  
10          offhand.

11                      **A. Well, I can only answer questions related to**  
12           **F876 because that's the only standard that you have**  
13           **available for me to review. So what question**  
14           **specifically do you have about ASTM F876?**

15                      Q. Does it permit or does it call for retesting  
16           of the sample that fails to meet the 65 percent  
17           number?

18                      **A. Does it call for or permit? You said both.**

19                      Q. Does it call for?

20                      **A. Can you point me to a particular section**  
21           **that you are concerned about?**

22                      Q. You are the tubing expert and not me.

23                      **A. Okay. Then I will --**

24                      Q. Are you aware of any?

25                      **A. Then I will look at the standard in its**

1       entirety. There is one section, section eight, that  
2       states retest and rejection. If results of any test  
3       do not meet the requirements of this specification,  
4       the test shall be conducted again only by agreement  
5       between the purchaser and seller. Under such  
6       agreement, minimum requirements shall not be lowered,  
7       changed or modified nor shall specification limits be  
8       changed.

9               If upon retest failure occurs, the quantity  
10       of product represented by the tests does not meet the  
11       requirements of the specification. So based upon that  
12       language I would say no, it does not call for  
13       retesting.

14              Q. But it also doesn't say that it's not  
15       compliant with the requirements of the specification  
16       upon a single failure, doesn't it?

17              A. It does not say that. You're  
18       misrepresenting what it states.

19              Q. Well, it says upon agreement between the  
20       manufacturer and the seller, a retest can occur.  
21       Right?

22              A. It says it can occur only upon agreement.  
23       You're mischaracterizing what the standard states.  
24       This test shall be conducted again only by agreement  
25       between the purchaser and seller. That is what the



1           **standard states, not maybe, shall be only conducted by**  
2           **agreement between the purchaser and seller.**

3                   MR. KUHLMAN: All right. Let's go off the  
4           record for a few minutes. I'm going to track down  
5           this gel testing standard.

6                   (A recess was taken.)

7                   Q. Okay. We've looking at table six and some  
8           of the gel testing results that you received that are  
9           outlined in table six of this report. And when you  
10          were calculating that approximate number of 22 percent  
11          of the field-return samples coming in under  
12          65 percent, how many of those samples came in at under  
13          65 percent in the tests performed pursuant to the  
14          standard with decalin?

15                  A. We only evaluated three samples with  
16          decalin. And based on the decalin result alone, when  
17          tested at that location, none of those samples were  
18          shown not to conform --

19                  Q. And --

20                  A. -- none of these three.

21                  Q. And in the other cases that you have worked  
22          on, are you aware of any samples that failed to meet  
23          the minimum gel content when tested in accordance with  
24          the standard using decalin?

25                  A. Yes.

1 Q. Which case was that?

2 A. Christianson. If memory serves me  
3 correctly, testing performed on behalf of ESI showed  
4 some samples that were crosslinked below 65 percent.

5 Q. There were three samples tested with decalin  
6 in Christianson and all three came in over 65 percent?

7 A. That's not my recollection, but maybe I'm  
8 mistaken. If you have a copy of the Christianson  
9 report, I'd be happy to review it. It's been almost  
10 two years now since I have looked at that data.

11 Q. Okay. I think we can just agree to disagree  
12 on that. Okay. So you're aware of one sample in all  
13 the samples that you've looked at that failed to meet  
14 the gel content standard when tested in accordance  
15 with the standard using decalin?

16 A. I don't know that that is correct, no.

17 Q. So at most, one?

18 A. No, I don't know that that is correct. I  
19 believe that there could have been more than one.

20 Q. Okay. Which cases -- were there other  
21 samples that failed to meet the gel content when  
22 decalin was used?

23 A. I believe there were also some samples  
24 associated with the Pulte Homes cases that showed to  
25 be under-crosslinked when tested with decalin.

1 Q. Do you have any test reports or data from  
2 that matter?

3 A. I have what's been produced in the case from  
4 that matter --

5 Q. Okay.

6 A. -- which included some reports from Duane  
7 Priddy and I don't know if they were included in their  
8 entirety or not. I'm basing that on my recollection  
9 from what I have reviewed in the past in the  
10 Christianson case.

11 Q. Are you relying on these gel content numbers  
12 from other cases when you calculate this approximate  
13 22-percent number?

14 A. Yes.

15 Q. And are you relying on samples that would  
16 have fallen into the range of 64.5 to 65 when  
17 calculating that number?

18 A. Yes.

19 Q. And are you relying on samples that tested  
20 under 65 that were tested in xylene as the solvent?

21 A. Yes. I'm also relying on the data generated  
22 by Jana evaluating new pipe that had never been in  
23 contact with water documenting under-crosslinking and  
24 variability in the crosslinking within the pipe wall.

25 Q. Are you relying --

1           A. Not in determining the number, but in  
2           rendering opinion about crosslinking.

3           Q. Are you relying on the hundreds of pages of  
4           gel testing results that were produced by NIBCO in  
5           this matter showing sample after sample meeting the  
6           requirements?

7           A. Not in calculating a number as we discussed  
8           yesterday. It's based upon a review of field-return  
9           analyses related to failed pipe. I believe I had  
10          stated that that number was related to incident pipes  
11          that have leaked, that roughly 22 percent of them were  
12          found of under-crosslinked. The issue only becomes  
13          important because the degree of crosslinking impacts  
14          the strength of the pipe and its resistance to creep  
15          rupture, which is the propagation mechanism through  
16          the wall by which this underlying defect manifests.

17          So it would influence the rate to failure  
18          that we see in these homes or the time to failure or  
19          perhaps even the location of the failure. However, we  
20          know from the fact that most of them were not  
21          under-crosslinked that it's not a necessary condition  
22          for failure to occur and that the underlying defect  
23          exists whether they were under-crosslinked or not.

24          Q. If you're preparing this approximate  
25          22-percent number based on the results of gel content

1 tests that were done on field-return samples, why did  
2 you include testing performed by Jana on unused NIBCO  
3 PEX?

4 A. I stated clearly just a moment ago, I did  
5 not include that in the number. And the number is  
6 intended to be a ballpark number. You seem to be  
7 really concerned about the accuracy of the number.  
8 It's not in anyway held out and as an accurate number.  
9 I gave you a ballpark approximation based upon what  
10 data such as this would suggest. So please don't  
11 misinterpret what that number is meant to reflect.

12 And I stated momentarily ago that I did not  
13 rely upon Jana's results for a quantification of a  
14 percentage, but with regard to affirming that there is  
15 nonuniformity. And the other opinions I have  
16 regarding rounding and variability within the pipe  
17 wall and what the significance is of a 65.0, for that  
18 I have additionally relied upon Jana's work.

19 Q. Are you planning to render any opinions  
20 about the percentage of NIBCO PEX that left the  
21 factory at a rate of gel content under 65 percent?

22 A. I don't have a plan for anything at this  
23 point. We'll see where this case goes and I will  
24 answer any questions that I am asked as honestly and  
25 completely and accurately as I'm able to.

1 Q. Have you ever been arrested?

2 A. No.

3 Q. Have you ever been convicted of a felony?

4 A. No.

5 Q. Have you ever been convicted of a

6 misdemeanor involving dishonesty?

7 A. No.

8 Q. Has Paragon Polymer Consultants been sued

9 for any reason?

10 A. No.

11 Q. What about Vanguard?

12 A. No.

13 Q. Have you personally been sued for any

14 reason?

15 A. No.

16 MR. KUHLMAN: All right. So let's go off

17 the record.

18 (A recess was taken.)

19 MR. KUHLMAN: All right. I don't have any

20 other questions today. Thank you for your time.

21 MR. SHAMBERG: We will read and sign. No

22 questions here.

23 MR. KUHLMAN: I guess you've got both. Is

24 that announcement for both cases?

25 MR. SHAMBERG: You guys have any questions?

1 MR. EDWARDS: We don't.

2 MR. SHAMBERG: No questions for the Meadow  
3 or Cole plaintiffs.

4 (The deposition concluded at 4:20 p.m.)

5 (Reading and signature were reserved.)

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1           STATE OF NORTH CAROLINA     )  
2   )     CERTIFICATE OF TRANSCRIPT  
3           COUNTY OF MECKLENBURG     )

5 I, Mary L. Labonte, RPR, and Notary Public in and  
6 for the aforesaid county and state, do hereby certify  
7 that the foregoing pages are an accurate transcript of  
8 the deposition of Cynthia Smith, Which was reported by  
9 me on behalf of Defendants in machine shorthand and  
10 transcribed by computer-aided transcription.

11                   The deponent and parties reserved the signing of  
12           the deposition by the deponent.

I further certify that I am not financially interested in the outcome of this action, a relative, employee, attorney or counsel of any of the parties, nor am I a relative or employee of such attorney or counsel.

18 This 30th day of May, 2017.

19

20

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21 Mary L. Labonte

22 Registered Professional Reporter

23 Notary Public No. 201227500033



WITNESS'S CERTIFICATE

I, CYNTHIA SMITH, do hereby certify  
that I have read and understand the foregoing  
transcript and believe it to be a true, accurate, and  
complete transcript of my testimony, subject to  
the attached list of changes, if any.

\_\_\_\_\_  
CYNTHIA SMITH

This deposition was signed in my presence by  
\_\_\_\_\_, on the \_\_\_\_\_ day of  
\_\_\_\_\_, 2017.

\_\_\_\_\_  
Notary Public

My commission expires:

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